

# The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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## A New Testing Machine.

During the past ten years the desire for improved testing apparatus has become general. Manufacturers and consumers alike have become awakened to a keen appreciation of the fact that, to economically use material of any kind, it is necessary to have a perfect knowledge of its quality. Within a few years the value of exact knowledge in regard to the quality of iron has become not only desirable, but absolutely essential. Modern inquiry demands of the manufacturer a quality so high, that it is essential to know exactly what grade is produced. Good material also commands so much better price, that the manufacturer wishes to be able to recognize the best, in order that he may in no case lose an advantage. Some years ago the Master Car Builders' Association began the discussion of the mileage of car wheels. The discussion brought together, upon several occasions, the leading manufacturers in the country, and was in the end of very great value in bringing the railroad people to see the necessity of a good wheel. If we mistake not, the average guaranteed mileage rose within a year from about 45,000 to 60,000 miles, and the average life of car wheels came up in a still greater proportion. The roads became willing to pay for better material, and in the end began to seek for still more durable

by means of a screw operated by gearing. Hand or steam power may be used for the purpose. The change from one to the other may be made instantaneously, by means of the hand lever shown at the right of the main column of the machine in Fig. 1. This lever operates through a set of friction cams, and causes the screw to run upward or downward at pleasure. The weighing is done by means of three beams, coupled in the manner shown in Fig. 1. The central beam is graduated for two poises, one upon the upper and the other upon the lower edge. The smaller poise registers up to 1000 pounds, and the upper from 1000 to 10,000. A suspender rod at the left carries the weights, which are of 10,000 pounds each. The coincidence of the line of strain with central line of the specimen is accomplished by making the weighing head, which transmits the strain from the specimen to the knife edges of the large beam, run in guides both above and below. To do this the top and bottom of the head are both made cylindrical, and fit the guides on the main column of the machine. To secure truth in all the parts, the two guides in which the weighing head moves, and the inside of the sleeve through which the pulling screw is worked, are bored out with the same boring bar and at the same time, thus insuring that their axes are the same. With weighing head and screw both working in the same straight line, it is evident that there is no ten-

only is the latter one-third cheaper, but the American manufacturer makes a study of the island of Cuba, and his plow is consequently perfectly adapted to its requirements. So with heavy machinery on sugar estates; the planters find that, as a matter of course, an article whose prime cost is less, which has less freight to pay, and which is made expressly to suit the island, is preferable to the English one, which does not possess these advantages. In railway plant also the Americans are beating us, for the same objection is raised to the English manufactures; rails for instance, of the section required here, have to be rolled expressly in England, so that the purchaser has to give his orders four months in advance, whereas in the United States he finds his rails ready for immediate shipment and cheaper into the bargain."

## Tramways.

At a meeting of the British Society of Engineers, held on Monday evening, April 21, in the society's hall, Victoria street, Westminster, a paper was read by Mr. J. L. Haddan, on "The Essentials which Should Govern the Construction and Working of Tramways." The author observed that when tramways were first introduced they were a great advance upon the ordinary roads, but that the modern improve-

## SCIENTIFIC AND TECHNICAL.

The Engineer publishes an interesting paper by Mr. Robert Mallet on some

### CURIOUS PHENOMENA OF REFLECTION.

which, he observes, may give a cue to the explanation of the magic mirrors of Japan. Many years ago Mr. Reeks, of the London School of Mines, noticed that the image reflected in bright sunlight from a silver coin, which by abrasion of wear had become practically flat, and from which all traces of image and superscription had vanished, was different, in the intensity of the light reflected, from what had once been the field or depressed part and from the head. A silver half crown was struck at the Royal mint showing the Queen's head on the obverse side, but without any design on the reverse face, where a flat surface of polished steel was placed in the coining press in place of the usual reverse die. When this flat and polished side was exposed obliquely to bright sunlight, the reflected image thrown upon a flat surface not only presented with much distinctness and accuracy the outline of the head, but also a portion of the "Victoria" surrounding it, the head and inscription being shown by a far more brilliant light than the rest. This suggests some interesting inquiries in regard to the flow of metals. The *Techniker* mentions

blown through; thus the iron is quickly heated, and kept hot so long as the blast is maintained. If a short interruption occurs, it is not found necessary to heat the platinum anew at the other flame.

Mr. M. Winter, of Vienna, has invented and patented in Germany a process for MAKING ENLARGED PHOTOGRAPHIC REPRODUCTION ON TEXTILE FABRICS.

He draws the fabric through a solution of 4 parts by weight of bromide of potassium, 1 part of bromide of cadmium and 240 parts of water, in such a manner that both sides are thoroughly moistened. Then it is hung up to dry. If the temperature is too low, iodides are added. The dry fabric is then moistened in the same manner with a solution of 4 parts by weight of nitrate of silver, and 1 part of citric acid in 140 parts of water. The dried fabric is suspended and exposed, with the aid of an electric light, until the picture is clearly visible, which generally will take from 1 to 4 minutes. It is then developed in a solution of 10 parts of pyro-gallic acid and 45 parts of citric acid in 410 parts of water, and is finally treated in the ordinary manner with a gold solution, fixed and washed.

Mr. D. N. Carvalho claims to have discovered a simple means of

SHORTENING THE EXPOSURE IN PHOTOGRAPHING, by painting the whole interior of the studio

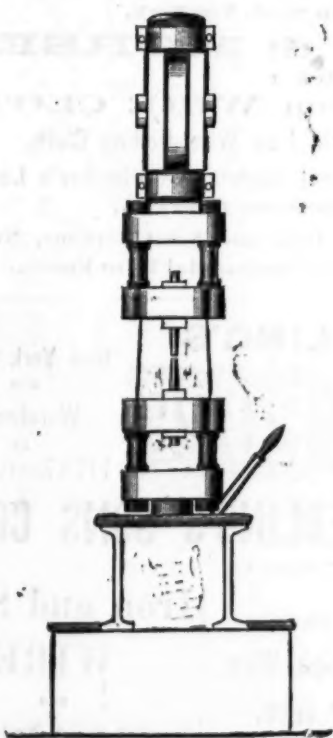


Fig. 2.—End View.

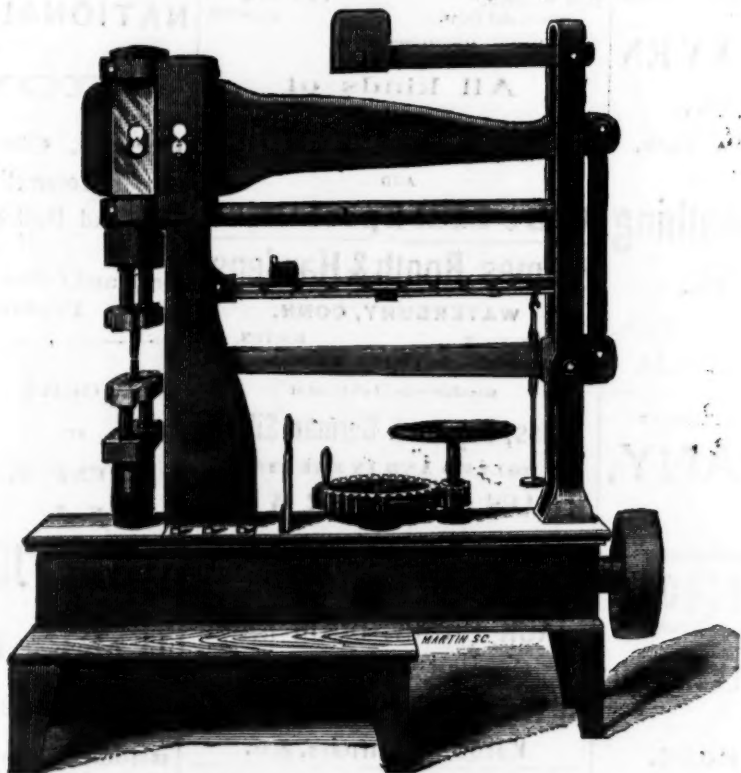


Fig. 1.—Perspective View.

NEW AND IMPROVED TESTING MACHINE, BY JOHN L. GILL, JR.

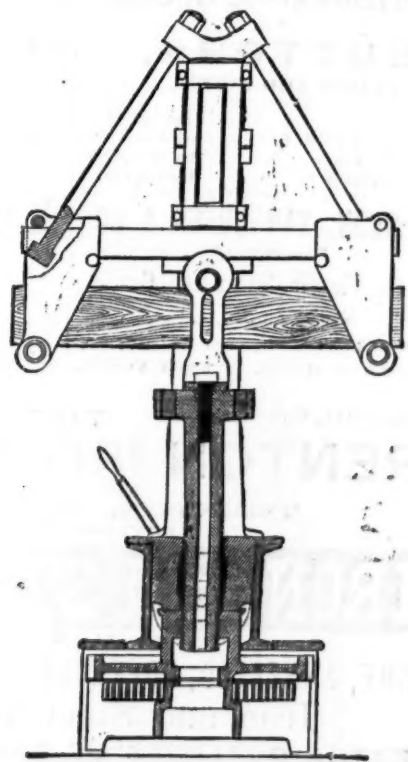


Fig. 3.—End View of Machine Arranged for Transverse Test.

wheels. The effect upon wheel makers was very marked. It was no longer possible to use any iron that would take the proper chill, and, pouring it into a mold, to make a saleable car wheel. An intimate and accurate knowledge of the irons used became necessary. This may be seen from the fact that wheel makers improved their product to such an extent that it would be an advantage for them to sell wheels upon a high mileage, and stipulate for an additional price for each 10,000 miles that they exceeded the stated figures. Some years ago—even before an improvement in quality of wheels was demanded by the roads—Mr. John L. Gill, Jr., the well-known wheel manufacturer in Pittsburgh, Pa., began the work of accurately testing all the irons used in his establishment. At first this was merely a local or shop matter, but it soon became evident that the testing machines in the market did not work with the uniformity and accuracy desirable. Some three years ago Mr. Gill pointed out to us the fact that two specimens having precisely the same strength might, under very similar circumstances, show wide variations of strength in the same testing machine. To make a machine which would indicate accurately the strain upon the metal, and not by its own action unduly increase or diminish the resistance of the specimen to be tested, was the problem which he at once undertook to solve.

The testing machine which we illustrate is the result. This machine is designed to obviate the very common danger of pulling the specimens out of line, and so breaking them by tearing or bending them. In this way a specimen may yield to a load much below that which it could sustain if properly applied. The machine has performed most satisfactorily, and has had very high commendation from engineers. Fig. 1 shows the machine in perspective. Fig. 2 is a front view of the same machine when adapted for making test of tensile strength. In Fig. 3 the machine is shown arranged for making tests of transverse strength. In this cut the lower portion of the machine is shown in section. The strain is applied

dency to bend the specimen. These machines will test specimens by tension up to 1½ inches in diameter, and in length up to 18 inches. This great length is very desirable, as it has been found that short test pieces do not give a correct indication of the strength of the material. When used for transverse tests, it will take in specimens from 1 inch square and 12 inches long, to pieces 5 inches wide by 8 inches deep and 48 inches long, which is the size of the piece of timber represented in Fig. 3. These machines have worked with so much accuracy and their performance has attracted so much attention, that Mr. Gill is now manufacturing them for sale.

## American Competition with English Manufacturers in Cuba.

The English Consul-General in Cuba, Mr. Cowper, in a recent report to the government, warns English manufacturers against the growing activity of American exporters. "The English," he says, "are becoming less and less interested in the commerce of Cuba each year, and the United States more and more so. Machinery and hardware, in which we were once unapproachable, are falling into the hands of our rivals, the only remnants being a limited import of cutlery and large pieces of machinery, such as steam plows, sugar engines, &c.; but even these, from various causes, are now coming from other countries, notably the beautiful machinery from France, such as centrifugal machines, vacuum pans, and those connected with distilling. One of the largest imports from England was the large cane knife, or machete; some of these are still imported from England, but the fact cannot be, and is not, disguised from the buyers that these knives are inferior to those made in the United States and in Germany at equal prices. The only advantage possessed by the English article is superiority of polish; hence the decrease of the import from England. Take the English plow; it has no chance against the American, for not

ment of roadways had, in the present day, led almost to a reversal of the relative positions of road and tramway. In America the tramways were superior to the roads, because the latter were sacrificed to the former. The tram rail there, moreover, was available for the moderate ordinary traffic, while the speed of the train service was about 20 per cent. greater than in this country and on the Continent. Mr. Haddan alluded to the general tendency to employ wood in roadways, and he described a system of construction by which a road could be made with a perfectly flat surface and yet be well drained, and which should have the tramway incorporated with it. The tram rails, he said, would be of wood, and the roadway would be kept surfaced with grit, so that the wood would not form the actual wearing surface. This system of tram and roadway, the author observed, would be homogeneous, and would combine the best possible road for ordinary vehicles, with a perfect tramway for special carriages, at less cost than the present method of construction. The author condemned the indiscriminate introduction of railway and omnibus principles into the construction and working of tramways, and described his proposed arrangement for meeting the requirements of a tramway service. This consists of a locomotive engine, to be worked by steam and air, the steam being used for compressing, during the journey, its own supply of air, as well as that which supplies the continuous motive power for propelling the cars. By reversing, the same driving mechanism acts as a continuous brake, and the same system is so arranged that the driver constantly feels the pull of the train upon a regulator handle. The withdrawal of his hand from this handle is to instantly cause the steam power to block the train. Thus the brake mechanism would always be in action, instead of lying dormant as in ordinary continuous brakes. The author, in conclusion, stated what in his opinion were the technical, physical and administrative requirements of mechanical traction on tramways generally.

A NEW ANTISEPTIC SALT, which has been discovered by H. Hannosch, of Bernburg, Germany, who calls it "borcate." It is a compound of boric acid and soda and potassa, the description of the manufacture of which is obviously defectively given in our source of information. It is claimed to be useful for the preservation of meat, game, butter, eggs and other perishable commodities.

Jablochhoff, the inventor of the electric light which has been so thoroughly tested and condemned as too expensive in Paris, London and elsewhere, has brought out

### A NEW ELECTRIC LAMP

from the construction of which it would seem that he has abandoned the voltaic arc and joined the admirers of the incandescence principle. His new construction simply consists of a bifurcated holder, between the two arms of which a small strip of porcelain is clamped. Below it is an induction coil. A small strip of metal is attached to the lower portion of the porcelain plate. The incandescent porcelain, it is claimed, yields a beautiful, subdued light, while at the same time it is but slowly consumed.

A simple apparatus has been devised by Dr. Paquelin, of Paris, for

### HEATING SOLDERING IRONS

with a gas blow-pipe flame. A metallic box of the size of a thick book, and the inner arrangement of which is not stated, is placed by the workman in a side pocket of his coat. He connects it with two caoutchouc tubes, one of which goes to the soldering tool, the other to a small caoutchouc balloon lying on the ground. By treading on the balloon, air is forced through the box, and therein becomes charged with petroleum vapor. The soldering tool itself is hollow, and into it projects, at the fore end of the handle, a platinum point, through which the air, charged with hydrocarbon, is blown into the interior of the iron in fine current. In commencing work the platinum point is first brought to a glow in a neighboring spirit lamp; it inflames the gas mixture

—walls, doors, sashes and floor—with a uniform tint which he describes as "orange pea green." Well-known photographers—for instance, Estabrook and Bash, of this city, Ryder, of Cleveland, and others—substantiate his claims by the results of their experience, according to which they found it possible to reduce exposure from one-third to one-half.

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### DECOLORIZING YELLOW DIAMONDS,

which is attributed to M. C. Ribaltier. It consists simply of operating with closed vessels excluding the air, instead of using open crucibles, as has been done hitherto. The diamonds are packed into chemicals generally employed for the purpose, and are heated in furnaces similar to those used for the precious metals. An important point to be observed is to cool the furnace down very gradually. If this is done, it is claimed that the surface of the diamonds is not affected in any way, nor do they lose any of their fire.

The Metric System and the Board of Trade.—The monthly meeting of the Board of Trade and Transportation was held recently. On motion of Mr. Thurber, a series of resolutions asserting the superiority of the metric system to that now in use, urging the appointment of committees by every commercial organization in the country for the purpose of securing its ultimate adoption, and providing for the appointment of a special committee by the board to that end, were unanimously adopted.

The Saginaw Mining Company, Lake Superior, have leased the Hamilton and Merryman mining property adjoining the Norway, on which considerable exploring has been done, and have commenced mining. It has been fully and satisfactorily determined that two veins of ore of great width and length exist—one of slate and the other of hard, steely ore.



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SEE PAGE 9.

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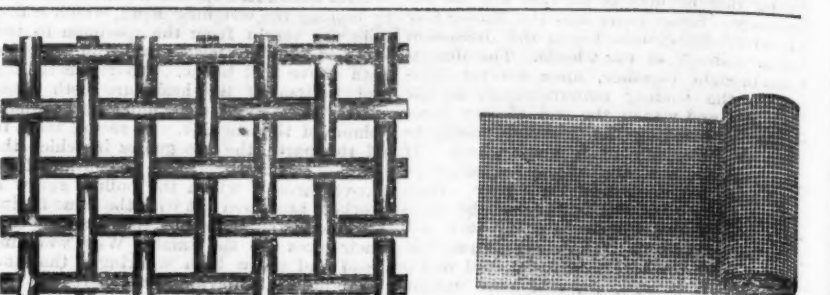
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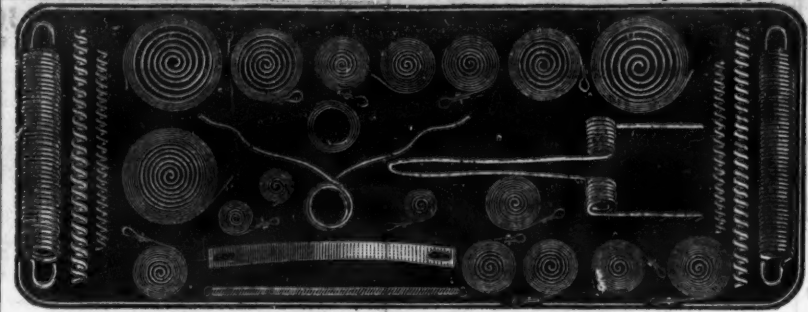
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### Cornice Making.

The cornice business, particularly since the war, has been more of a Western than an Eastern industry. The reasons for this are several. Immediately following the war building interests throughout the West were stimulated to the utmost, and all new ideas in building which promised fair results were eagerly seized upon and put into practice. Galvanized ironwork, which has a prepossessing appearance, naturally became very popular, and was employed upon all kinds of buildings. It was accepted unhesitatingly for almost all purposes, and it soon became the favorite decorative material—a position which it has held almost without challenge until a very recent time.

Before the war galvanized ironwork had been introduced and quite extensively used in New York and in some of the other Eastern cities, but the high price of iron, together with the general interruption of building interests at the commencement of the rebellion, served to destroy the business as it then existed, and its recovery at the close of the war was very slow. As an industry, the cornice business was in the full tide of prosperity in the West before it showed any signs of revival in the East, and at no time has it taken the strong position among Eastern builders that it has long held among those of the West.

Still other reasons may be given for the prosperity of the trade in the West, as contrasted with its condition in the Eastern part of the country. The character of the buildings which are popular in the Western States, is much more favorable to the liberal

workmen produces these copies, while another set shapes them, a third joins them by soldering and riveting and a fourth packs and ships, while a fifth attends to putting up at the building. Of course, such a system can be profitably maintained in a very large business; yet several of the largest concerns in the trade make no attempt at it. The advantage which their competitors possess over them, arising from this alone, is quite marked.

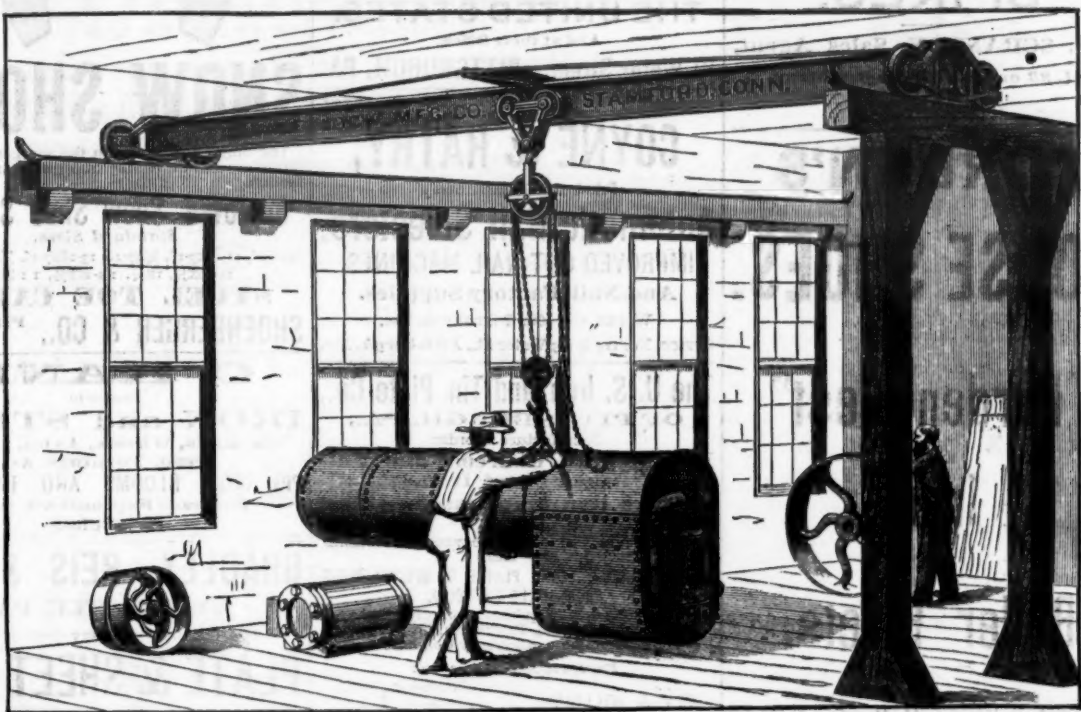
In small shops division of labor, up to a certain degree, is not only possible, but is quite profitable, and the shops which so conduct their business make a material saving in cost over those of their competitors which have no system, but which use their workmen interchangeably for all the different kinds of labor involved. A division of labor, upon consideration, seems just as necessary as having machines of different sizes for different parts of the work. A large brake is necessary for making moldings the full length of a sheet of iron. Small work may be formed in the same machine, but a smaller machine is more economical for the purpose. Men are the best suited for operating a large brake, but boys can use a small one successfully. Similar comparisons may be made with respect to other parts of the labor employed in cornice shops.

Our engraving shows a practical example of the working of a system of division of labor. It illustrates the method of managing small forming, in use in several of the Western shops, and which gives very satisfactory results. Two boys, or two sets of boys, according to the extent of the business, are required, as shown in the cut. One is constantly employed at the brake in

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use of galvanized iron than of those erected in the East. The taste of the people approves the use of galvanized iron in the one case, and opposes it in the other. With due deference to the Western people, we may say that in general they are fond of display in their buildings, and are pleased with striking features of design, to an extent which causes them to give more attention to the general appearance of an edifice than to the materials of which it is constructed. Perhaps we should qualify this by saying that formerly such was the case, for undoubtedly a change has taken place; and the fact that more attention is now paid to the construction employed in buildings, and that the fitness and appropriateness of materials are more carefully considered, is probably the reason why the cornice business is not so thriving in the West at present as it was some time since. There are fewer store fronts made entirely from galvanized iron in imitation of stonework now than formerly, and upon public buildings—court-houses, jails, school-houses and the like—the use of galvanized iron is at present restricted to cornice, roof and tower trimmings, &c., rather than extended to embrace pilasters, quoins, window caps and sills, belt courses and other parts of the wall finish, which in the past has been a common practice.

In the East galvanized iron has seldom, if ever, been used as a substitute for stone. The aesthetic taste of architects and builders has been opposed to the employment of a hollow shell as for a belt course, or wherever solid stone was demanded by the principles of construction. Servile imitation, a term which has been used against galvanized ironwork quite freely by its enemies, has never been merited in the East. The taste and good sense of the people have restrained them from the too free use of this class of work, and, as a consequence, have kept the business within narrower limits than it has found elsewhere.

The corresponding effects upon the trade in these sections of the country have been very marked. While at present the shops in the West are very generally experiencing a decline in the demand for cornice work, incidental to a reaction in the minds of the people, the shops in the East are kept comfortably busy. The Western shops built and equipped for the extensive trade which existed some time since, now find less to do than occupies their full capacity, while those in the East are fairly employed, they being no larger than existing demands serve to fill.

The system of manipulation in cornice making differs materially between different shops. In some a careful division of labor exists, while in others there is no attempt made at classification. The distinctions in this respect are not at all sectional, but are dependent upon the genius and methods of the managing men in the various establishments. In some shops distinct departments are maintained. A draftsman prepares the detail drawings. A pattern cutter gets out the patterns and marks upon them the number of duplicate pieces required. One set of

making the bends, while the other makes the forms, by means of different sized formers conveniently arranged in the edge of a bench for the purpose. The work comes to them cut and pricked, so that they have nothing else to do than to give it the proper shapes and deliver it to the solderers. Being thus constantly employed upon one thing they soon become very expert, and produce not only better work, but much more of it, than if continually changed about from one job to another.

The arrangement of formers, which is clearly shown in the engraving, is one which recommends itself for use in all shops, whatever may be the system of labor employed. It is compact and convenient. The formers pass through the edge of the bench, as shown, and through a corresponding piece fastened under the bench a short distance from the front, thus giving them a sufficient bearing to hold them firmly. The formers are provided with pins, which are put through their inner ends to prevent them being pulled too far through. Whenever former is wanted for use is drawn out, and when another size is wanted it is pushed back and the second one is pulled out. The top of the bench affords a convenient place for laying the pieces of work during the operation of forming.

**Underground Telegraphy.**—It is stated that the purchase of the patent right for a system of underground telegraphy has been consummated, in Philadelphia, between the Western Union Telegraph Company and David Brooks, the patentee. The patent consists in insulating telegraph wires in cotton, laying the whole in a wrought-iron pipe filled with petroleum. This is done to protect the wires from the moisture of the ground. Experiments have been made with this system by the Pennsylvania Railroad Company, which has used it in its block signalings with marked success. The wires incased in pipes were laid in trenches beside the track.

The rolling mill at Reading, Pa., owned by the Philadelphia and Reading Railroad Company, is using old car-wheels, which are made of charcoal iron, instead of pig iron in puddling, for the heads of rails. Mr. W. E. C. Cox, superintendent, says, in a recent letter to the secretary of the Iron and Steel Association, that all the rails made at the above-named mill are now made in this way, whether under contract for re-rolling or for new rails.

The Board of Health of Karlsruhe, Baden, publishes a notice stating that chemical analysis shows that the outer portions of the packages of American canned beef which have been in contact with the tin of the case, are impregnated with lead, and are injurious to health. Consumers are advised to cut off a thin paring on all sides of the package before using the meat.

The Philadelphia and Reading Railroad are testing iron cross-ties near the depot at Phoenixville, where traffic is very heavy.



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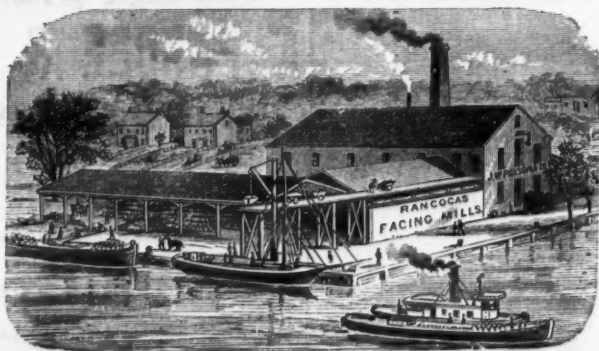
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\$2.75, f. o. b. Hacklebarney (most recent analyses,  
0.44, 0.37, 0.41, 0.357, 0.38, 0.35 phosphorus).  
Upper Tunnel, George and North Veins, \$2.60.  
"Red" Ore, \$3.00.  
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T Rails,

16, 18, 20, 22, 25, 28, 30, 35, 40, 45, 50, 56, 60 lbs. per yard.

**STREET RAILS OF ALL PATTERNS,**

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Special sections made if required.

Book of sections furnished on application.

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Iron Merchants & Railway Equipments.

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Sole agents Glasgow Iron Co. and Pine Iron Works manufacturers of "Stuck Bar" and all grades of Plate Iron. Celebrated "Glasgow" and "Pine" brands for fire boxes and difficult flanging. Pig and Bar Iron, Rails and all shapes in Iron. Quotations given on Bridge and Building Specifications.



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Manufactured from the celebrated OTIS STEEL

**BRAND**

**STANDARD.**

Quality and efficiency fully guaranteed. Prices as low as any of the same quality. We manufacture Heavy and Light Forging, Driving and Car Axles, Crank Pins, Piston Rods, &c.

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Exclusively for the

**Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags and Coal for Practical Metallurgical Purposes.**

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**J. BLODGET BRITTON.**

This laboratory was established in 1866, at the instance of a number of practical Iron Masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

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For determining the per cent. of Pure Iron in an ordinary Ore..... \$4.00

For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12.50

For each additional constituent of usual occurrence..... 1.50

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For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10.00

or each additional constituent..... 2.00

or the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12.50

For determining the constituents of a Clay, Slag, Coke, or of an Ash in Coal the charges will correspond with those for the constituents of an ore.

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Printed instructions for obtaining proper average samples for analysis furnished upon application.

**Connellsville Coke.**

FRANCIS WISTER,

230 South Third Street, Philadelphia.  
Best Coke for Furnace and Foundry Use.

**New Patents.**

We take the following abstract of new patents, recently issued, from the official record:

**LOOK.**

212,452.—To William E. Forster, Nashua, N. H., assignor of one-fourth his right to Erastus Dacy, same place.—Feb. 18, 1879.—1. The cylindrical tumbler for locks, the exterior surface of which is formed in rings or portions having different diameters, with recesses at the opposite sides thereof, and having the keyhole and bolt-throwing finger, as set forth.

2. In combination, the revoluble keyhole tumbler, provided with peripheral recesses, and the guard plate or plates, provided with oppositely projecting points or lugs, cor-

2. The combination of a tubular water or steam conductor, A, and a transparent tubular section, B.

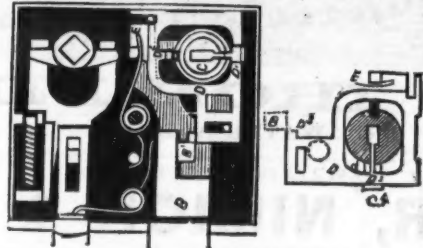
3. The combination of a main tubular water or steam conductor, A, and a transparent branch or switch tubular conductor, B.

4. The combination of a tubular water or steam conductor, A, a transparent section of tubing, B, a thermometer, C, and a check-valve, E.

209,539.—Hot, Cold and Waste-Water Cocks.—W. D. Abbott, West Chester, N. Y.—Nov. 5, 1878.

209,763.—Revolving Pocket Hand Stamps.—Wm. H. Keeler, Buffalo, N. Y.—Nov. 12, 1878.

209,774.—Screw Cutting Dies.—Ole Pederson, Joliet, Ill.—Nov. 12, 1878.



responding in size and position with said recesses, and distant from each other equal to the diameter of said tumbler.

3. In combination, the tumbler cylinder C, provided with peripheral recesses and finger C', the guard plate D, with oppositely projecting lugs D' D' and stop-lug D'', and the bolt B, with stop B'.

4. In combination, the tumbler cylinder C, with surfaces of various diameters, recesses d' d' and finger C', the extensible key F, the guard plates D, with guards or points D' D' and lug D'', the springs E and bolt B b, with stops B'.

**FURNACE FOR ROASTING ORE.**

212,508.—To Charles E. Robinson, Brooklyn, N. Y.—Feb. 18, 1879.—1. The process of roasting pulverized ores, consisting in subjecting a charge of the same to the simultaneous action of a jet of flame and of a jet of air, steam or gas introduced underneath the charge, whereby the particles of ore are kept in continual suspension and agitation during the whole operation.

2. In combination with the cupola, the

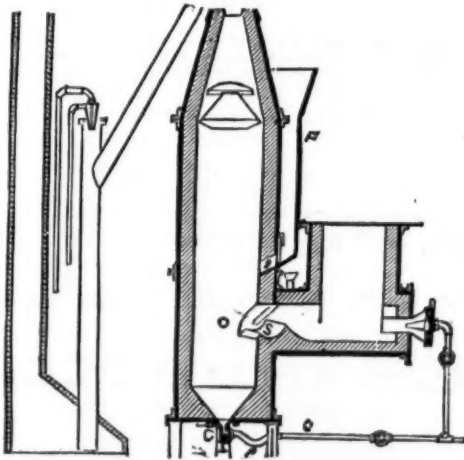
To provide for changing the angle of the cutters, and adapt the device to rods of different sizes, each cutter is held in two saddles, one pivoted to the frame and the other to the toothed ring. The concave back of the cover imparts a lead or clearance to the lip of the cutter.

209,584.—Combined Heater and Feeder for Boilers.—Rufus N. Pratt, Hartford, Conn.—Nov. 5, 1878.

209,899.—Steam Boilers.—Luther Knight, Arlington, Vt., assignor of one-half his right to William C. Allen, Cambridge, N. Y.—Nov. 12, 1878.

The ends of all the heating tubes are concentrated in the end extension of the boiler, by which all the water is made to pass through the perforated pipes in the upper portion of the boiler. The sediment trapped in the perforated pipes is carried down to a chamber at the bottom of the boiler, which is also provided with a perforated top. The mud is then blown out from this chamber.

209,812.—Locks.—John Jett, San Francisco, Cal.—Nov. 12, 1878.



air, gas or steam jet pipe or pipes G, the jacket F, and the discharge aperture g.

3. In combination with the base of the cupola, having a discharge aperture, the pivoted horizontally swinging gate C, the rigid jet pipe G, and flexible connecting piece p.

4. The combination, with the fuel chamber and cupola, of the salt pocket and feed pipe r.

**TACKLE BLOCK.**

212,566.—To Joseph W. Norcross, Boston, Mass.—Feb. 25, 1879.—1. The combination, with the sheave axle a and disks e and f, of the frame b, cast in one piece with the side frame a.

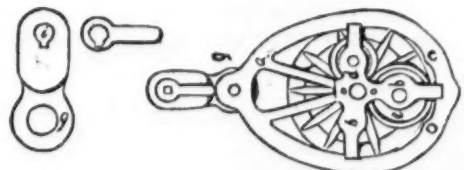
The bolt carries the tumblers, and they are held in position by a slight frame and springs.

209,845.—Machines for the Manufacture of Horseshoe Nails.—Job Whysall, jr., and Charles M. Merrick, New Brighton, Pa.—Nov. 12, 1878.

209,898.—Smoke Consuming Devices for Furnaces.—William M. Kirby, Pittsburgh, Pa.—Nov. 12, 1878.

209,782.—Manufacture of Auger Bits.—James Swan, Seymour, Conn.—Nov. 12, 1878.

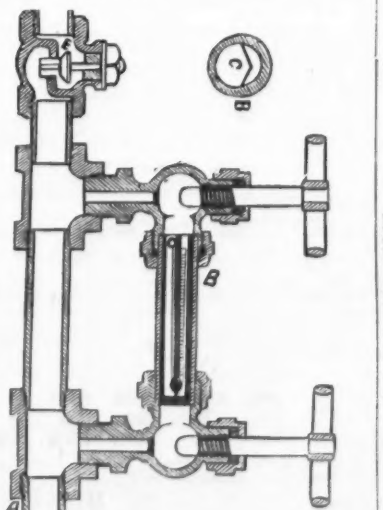
209,913.—Gage-Cocks for Steam Boilers.—Horace R. Morse, Concord, Ohio.—Nov. 12, 1878.



2. The combination, with the block, of the lock shackle, consisting of the eye g, the slot A, hole i, and locking bolt, provided with the spring arm and groove.

**INDICATOR FOR WATER-SUPPLY PIPES OF STEAM BOILERS.**

212,758.—To Charles Sprod, Philadelphia, Pa.—Feb. 25, 1879.—1. The combination,



with a tubular water or steam conductor, A, of a transparent section of tubing, B, and thermometer C.

209,921.—Lanterns.—Elias B. Requa, Jersey City, N. J.—Nov. 12, 1878.

210,106.—Screw Stocks.—Percival Everitt, Great Ryburgh, assignor of one-half his right to Frank Wheeler & Co., London, England.—Nov. 19, 1878.—Patented in England, April 16, 1878.

210,127.—Saw Swages.—Simon Kinney, Bay City, Mich., assignor of one-half his right to Chauncy Spearin, Chicago, Ill.—Nov. 19, 1878.

**REISSUES.**

8492.—Calendars.—C. W. Bryan, Springfield, Mass., assignor, by mesne assignments, to Clark W. Bryan and Jesse F. Tapley, same place. Patent No. 62,313, dated Feb. 26, 1867; antedated Dec. 11, 1866; reissue No. 3306, dated Feb. 23, 1869.—Nov. 19, 1878.

1. A calendar constructed of several superposed printed sheets, attached together at one edge, whereby the several sheets may be successively and easily removed.

2. A calendar constructed of several printed sheets attached to head piece.

3. A calendar constructed of several superposed printed sheets attached to a head piece, and having attached to last of said sheets a counting-house calendar.

1649.—Steam Boilers.—Jos. Firminich and Flavius P. Stiker, Buffalo, N. Y., assignors to Jos. Firminich, George Firminich and Frank Firminich, same place. Patent No. 169,977, dated Nov. 16, 1875.—Nov. 19, 1878.

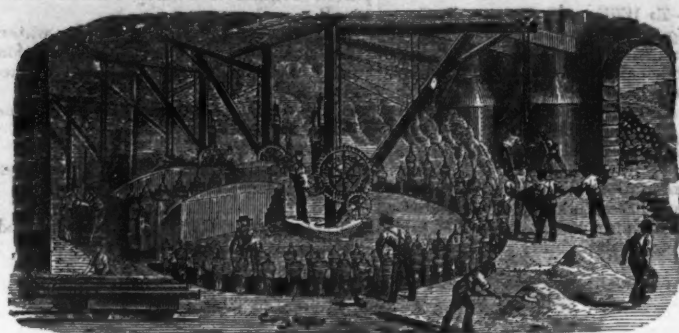
8495.—Sap Spouts.—J. B. Sargent, New Haven, Conn., assignor, by mesne assignments, to Charles C. Post, Burlington, Vt. Patent No. 76,530, dated April 7, 1868, Nov. 19, 1878.



## McNEALS & ARCHER,

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Flange Pipes.



General Foundry Work.

## CAST IRON PIPES

FOR WATER AND GAS.

ESTABLISHED IN 1845.

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MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED

## STEEL,

Warranted Equal to any Produced.

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For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

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For Rollers, Fire-Boxes, Smoke Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement is unequalled for surface finish and exactness of gauge.

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For Shafts, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c., Cast and German Spring and Plow Steel.

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"Soft Steel Center" Cast Plow Steel.

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Finished Rolling Plow Counters with Patent Screw Hubs attached.

Agricultural Steel cut to any pattern desired.

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CRUCIBLE AND OPEN HEARTH STEEL.

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## CHILLED RAILROAD WHEELS

For every kind of service, including Street, Mine and Lumber Trams. Wheels furnished in rough bored or on axles. Chilled castings made to order.

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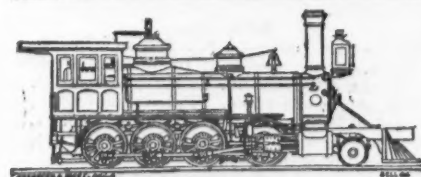
Steel Rails, Frogs, Crossings & Switches.

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Works at Baldwin Station, Pennsylvania Railroad, near Harrisburg, Pa.

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BURNHAM, HARRY, WILLIAMS & CO., Proprietors,  
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Manufacturers of

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These machines are nearly noiseless in operation; show no smoke with the use of anthracite coal or coke as fuel, and show no steam whatever under ordinary conditions of service. They can be run at two or three times the speed of horse cars and draw additional cars. Circulars with full particulars supplied.

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Miner and Contractor of Fossiliferous Ores.

A superior article delivered at low figures at any furnace within the district or at any point on the Ohio River. Refer to Roane Iron Co., Chattanooga Iron Co., or S. B. Lowe, Chattanooga.

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Dealer in Charcoal and Coke Pig Iron for Foundry, Forge or Car Wheel purposes.

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## LIGHT GRAY IRON CASTINGS

MADE A SPECIALTY BY

## TAYLOR & BOGGIS,

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Having extensive machine shop connected with foundry, we are enabled to fit up all kinds of light Hardware or patented articles. Correspondence solicited.

## IRON AND STEEL DROP FORGINGS

All shapes, small and large, including

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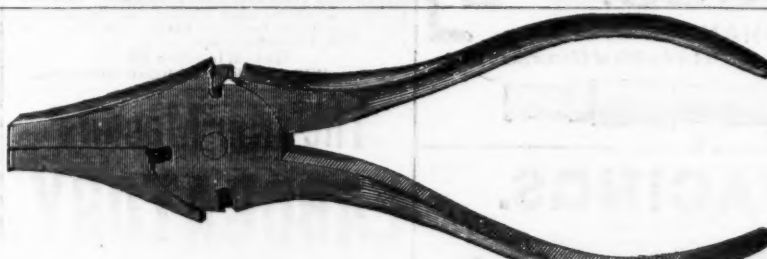
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## IRON CASTINGS

For Car, Carriage and Tinsmiths' Hardware.

Corner Taylor and Buttonwood Streets, - - - WILMINGTON, DEL.



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Manufacturers of the BUTTONS PATENT

## "WIRE CUTTER AND PLIER COMBINED."

Specially Adapted for Use on Wire Fence.

Also Manufacturers of

Blacksmith and Machinists' Stocks and Dies, Plug and Taper Taps, Hand, Nut and Screw Taps, Pipe Taps and Reamers.

Price List on application.

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Nos. 6, 7, 8, 9 and 10, for using plain.

Nos. 12, 12½ and 13, for making into Barb Wire.

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Send for prices and samples.

## Lewis, Oliver & Phillips,

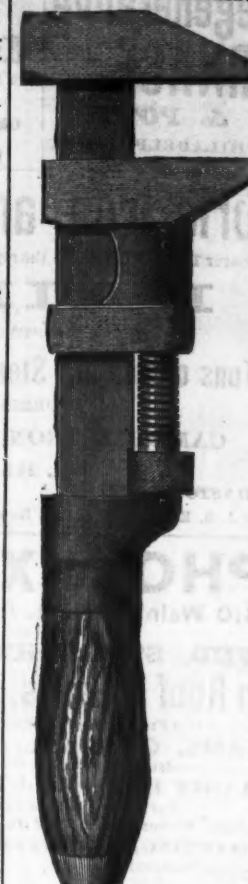
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WARRANTED.



FOR STRENGTH AND Durability IT HAS NO SUPERIOR. GUARANTEED IN EVERY RESPECT.

Wrought Bar, Head and Screw.

Owing to the increased demand for these justly Popular Wrenches, we are now manufacturing more than any other establishment in the world.

Our Wrench having been imitated by other manufacturers, we have adopted the above Trade Mark, and will hereafter stamp all our goods.

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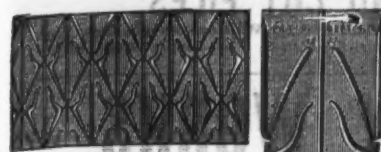
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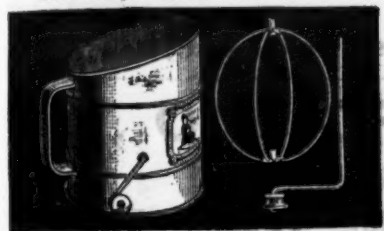


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Wires on both classes fastened without solder. The cheapest and most saleable in market. 247 & 249 Pearl St., New York.



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This Hinge has two flat coil springs, very powerful. It has a heavy solid pinial, giving much less friction than a hollow pinial. It has broad, solid bearings in the knuckle, which do not wear down readily and let the door sag. It is a fast joint, therefore can be used for either right or left hand. By actual test it has an average of 50 per cent. more power than other Spring Hinges in common use of same size.

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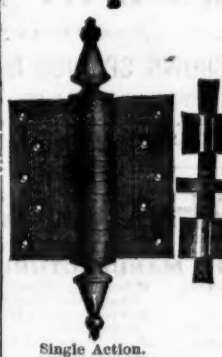
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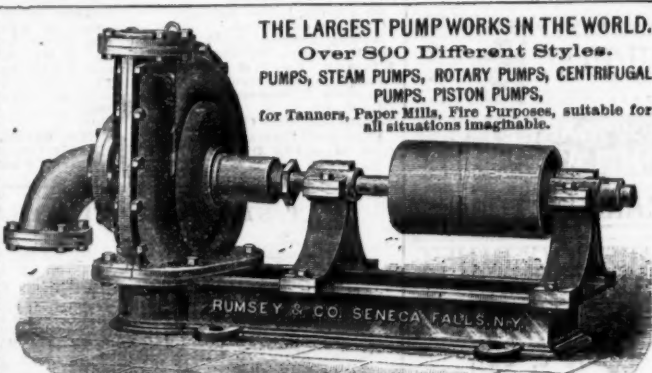
Single Action.



Double Action.



Horizontal Centrifugal Pump, Fig. 201.



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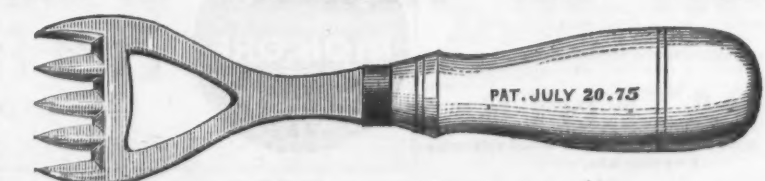
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Much of the superior excellence of the work made by American mechanics and machinists in a surprisingly short time, is admittedly due to their adherence to the principle of using good tools only, and, while they make exacting demands upon them, they show a correct appreciation of their value, and are quick to perceive and determine the advantages and disadvantages of any novelty presented to them. This is well understood by inventors and manufacturers, who are unceasing in their efforts to anticipate the wants of the workshop. A recent tool, brought out for the general use of mechanics and machinists, are the Reliance Wrench Tongs, the construction of which will be readily understood by referring to the accompanying illustration. A thread is cut upon the main stem of the wrench or tongs, upon which a sleeve, with a corresponding thread, can be moved up or down. It is by means of this movable sleeve that the tongs are adjusted to any size of pipe, nut, &c. The adjustable jaw is cast with a lever, which allows the stem to pass through it and enables the operator



RELiance WRENCH TONGS.

to take a secure grip. When using the tongs the lever is thrown out a little from the handle, and the sleeve is adjusted until the movable jaw engages the pipe. If the lever is then forced toward the handle again the jaw takes a firm hold on the pipe, owing to the shape of the collar at the end of the sleeve. Force applied to the handle in one direction will only have a tendency to push the jaw against the stem, and thus keep the lever in place; if reversed, it throws the lever out and slips back, like a ratchet, for a fresh grip. By reversing the position of the tongs on the pipe it can, of course, be made to turn either way.

All the parts are made of cast steel, except the handle, which is a malleable casting riveted to the stem. The adjustable jaw and the sliding sleeve are both hardened. The tool is applicable to pipe, bolts and nuts. The lever is always at the same distance from the handle, whatever the size of the pipe, so that the inconvenience of grasping two handles wide apart is avoided. These tongs, which are sold by L. B. Eaton, of Philadelphia, are now made in two sizes, ranging from 1/4 inch to 1 inch or more, and from 1 to 2 inches.

### Celluloid.

Although celluloid was invented nine or ten years ago (by two brothers named Hyatt), its perfected manufacture has been regularly in progress for only about five years, and is considered to be still in its infancy; yet immense quantities of the substance are produced; it is converted into a wonderful variety of forms, and new modes of applying it are discovered almost daily. Celluloid is a composition of fine tissue paper and camphor, treated with chemicals by a patented process. A rather common impression that it contains gun-cotton is a mistake, which arises from confounding it with collodion. Celluloid, it is said, is entirely non-explosive, and burns only when in direct contact with flame. When crude it looks like a transparent gum, and its color is a light yellow-brown. It can be made as hard as ivory, but is always elastic, and can be readily molded into every conceivable form. With equal ease it can be colored in any tint desired, the dye running through the entire substance, and being, therefore, ineffaceable.

All the celluloid made is produced by a single company, with factories in Newark,

N. J. This company makes only the raw material, which it sells to various manufacturing companies for so much per pound and a royalty on their net sales. No one can buy it unless the producing company decides to give him a license, which is granted only for the purpose of making some new article that will not interfere with the trade of the companies already licensed. A number of large corporations are now engaged in the various branches of manufacture for which celluloid can be employed.

The cost of the crude article to the buyers is regulated by the producing company according to the use to be made of it and the competition met with in other materials. For instance, \$4 or \$5 per pound are charged for celluloid which is to be made into jewelry, while only \$2 are charged if it is designed for umbrella handles, though there is no difference in the quality of the substance. In consequence of this system there is a similar wide variation in the cost of the manufactured articles.

As a close imitation of ivory, celluloid has made great inroads in the business of the ivory manufacturers. Its makers assert that in durability it is much superior to ivory, as it sustains hard knocks without injury, and is not discolored by age or use. Great quantities of it are used for piano and organ keys, to the manufacture of which one company is devoted. So extensive is its use for this purpose that the ivory manufacturers have reduced their price for keys below that of celluloid, in the hope of checking the competition. "It is only a question of who can hold out longest," said a celluloid manufacturer; "but we can make our own elephants, and the ivory men have got to catch theirs."

Billiard balls are made of celluloid at half the price of ivory, and are said to be equally elastic, while more durable. Large amounts are used for combs of every variety, for the backs of brushes and hand mirrors, and for all kinds of toilet articles which ivory is employed for. Even a fine-tooth comb made of celluloid is 25-per cent. cheaper than ivory, while in large pieces, such as the backs of hand-glasses, the difference in price is enormous. Among many other articles in which celluloid takes the place of ivory or india-rubber, are whip, cane and umbrella handles, every kind of harness trimmings, foot-ropes, chessmen and the handles of knives and forks. Its use in cutlery is said to be especially desirable, as it is not cracked or discolored by hot water.

India rubber, as a general rule, holds its ground against celluloid, as the latter cannot be sold so cheaply. The celluloid is said to be much more durable, however, and it is superior for pencil cases, jewelry, &c., where gold mountings are used, as it does not tarnish the metal, whereas the sulphur in india rubber tarnishes gold which is less than 18 carats fine. The freedom of celluloid from sulphur, and the natural flesh color which can be imparted to it, have caused it to be extensively substituted for india rubber in the manufacture of dental blanks, or the gums and other attachments of artificial teeth.

Celluloid can be mottled so as to imitate the finest tortoise-shell, and its elasticity renders it much less liable to breakage. In this form it is used, like the imitation ivory, for combs, card cases, cigar cases, match-boxes, pocketbooks, napkin-rings, jewelry and all sorts of fancy articles. The substance is employed for similar purposes as a good imitation of malachite and also of amber. It is made into mouthpieces for pipes, cigar-holders and musical instruments, and is used as the material of flutes, flageolets and drumsticks. For drumheads it is said to be superior to parchment, as it is not affected by moisture in the atmosphere.

As a substitute for porcelain, celluloid is used for the heads of dolls, which can be hammered against a hard floor without danger of fracture. Beautiful jewelry is made of it in imitation of the most elaborately-carved coral, reproducing all the shades of the genuine article. Most of the corals tints are bright or dark red, however, as the makers, strange to say, have found that excellent copies of the costly pink coral are not in popular demand.

One of the large manufacturing companies is employed exclusively in the making of optical goods, using celluloid in place of tortoise-shell, jet, &c., for the frames of spectacles, eye glasses and opera glasses. The material is extensively used for shoe tips, protecting the toe as well as metal tips, and having the appearance of patent leather. By shoemakers it is also used for insoles. Large quantities of thimbles are made of it, and it is said to be the best material known for emery-wheels and knife-sharpeners. As a ground for paintings, celluloid has all the advantages of ivory, and photographs can be taken on it which are alleged to be superior to ivorytypes.

Within the last year and a half another branch of celluloid manufacture has been developed which promises to reach enormous proportions. This is the use of celluloid as a substitute for linen or paper in the making of shirt cuffs, collars, &c. It has the appearance of well-starched linen, is sufficiently light and flexible, does not wrinkle, is not affected by perspiration, and can be worn for months without injury. It becomes soiled much less readily than linen, and when dirty is quickly cleaned by the application of a little soap and water with a sponge or rag. For travelers and for wear in hot weather, this celluloid linen is especially convenient. It has lately been much improved by the introduction of real linen between two thicknesses of celluloid. Shirt-fronts have been made of it, as well as cuffs and collars, and it is believed that these will prove equally desirable.

Celluloid has been experimented with as a material for neckties, and although the trials have not yet been very satisfactory, it is thought that they will eventually be successful. For hat bands and hat sweat bands it is a trifle more expensive than the materials commonly used, but it is said to be better, as it does not become rusty or greasy. It has also been used lately for watch cases.

There is a large export trade in celluloid articles to Cuba and South America, and this is constantly increasing. They are not sent to Europe, as the right to manufacture and sell them there has been sold to a foreign company, which has a factory in France.





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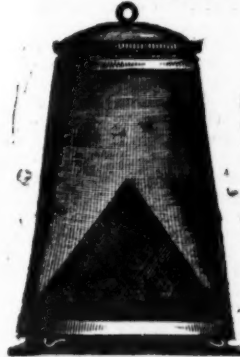


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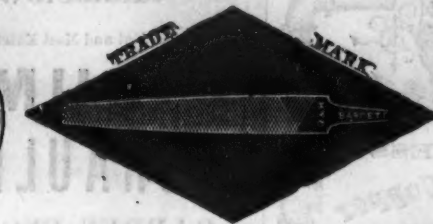
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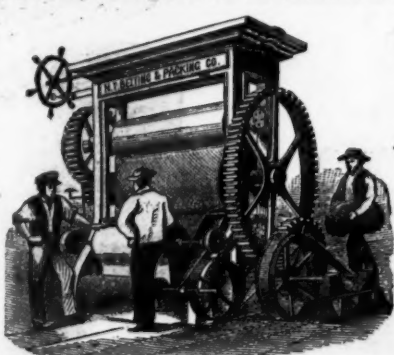
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## PARIS EXPOSITION.

### THE EXHIBIT OF IRON AND STEEL.

An Abstract of the Report by the Hon. Daniel J. Morrell, Commissioner to the Paris Exposition from the United States.

(Concluded.)

### CAUSES OF THE UNIVERSAL BUSINESS DEPRESSION

Leaving the Paris Exposition, I now turn to a consideration of the present condition of the European iron and steel industries. First, however, it is proper that some notice should be taken of the present industrial condition of all countries which are largely devoted to manufactures.

That the manufacturing industries of leading European countries, as well as of the United States, have been depressed for many years is news to no reader of this report. Europe being more exclusively devoted to manufactures than the United States, and having a dense population, has suffered the most from this depression.

The inquiry is naturally suggested whether the universal depression has been created by the numerous wars of the past few years. Undoubtedly these wars influenced unfavorably the manufacturing industries of many countries, by first partially arresting their healthy activity and afterward unduly stimulating their development. In the United States, Austria and Germany, this forcing of manufacturing activity was accomplished largely through the influence of an increase in the currency, itself a result of war; but neither the recent wars nor the inflation of the currency which accompanied some of them will sufficiently account for the depression and distress with which the civilized world is to-day so familiar.

First among additional causes may unquestionably be placed the influence of machinery in cheapening and increasing manufactured products. By means of the mechanical inventions of the past 20 years manufacturing nations have attained a productive capacity in excess of the consumptive capacity of both civilized and half-civilized nations. This development of manufacturing facilities would have taken place if there had been no wars.

Next among the causes of world-wide depression must be placed the slackening of the demand for new railroads. For a period of about 10 years prior to 1873 all of the leading countries of the world, and many of the second and third-rate countries, were actively engaged in building railroads to afford means of communication between the several parts of their territories or to develop their latent resources. In 1873 and immediately succeeding years it was found that as many of these railroads had been constructed as were required by the necessities of the countries building them, or as they were able to pay for, or could borrow money to pay for, and with the total or partial cessation of the demand for new railroads, a check was at once given to all the industries which had been built up or enlarged in expectation of a continuance of this demand.

To show how rapidly the iron industry alone was developed in the years immediately preceding the beginning of the present depression, I give the statistics of the world's production of pig iron in each of the years 1855, 1872, and 1873, as follows: 1855, 6,889,906 English tons; 1872, 14,470,358 tons; 1873, 14,706,459 tons. In 1873 production reached its maximum, and since then it has steadily declined, the figures given in the beginning of this report showing a present annual production of only 13,807,725 tons.

While the fever for building railroads was everywhere at its height, another influence was actively at work to assist in destroying the prosperity of the iron industry by destroying, to a large extent, the demand for iron itself. A revolution involving the general substitution of steel for iron had been commenced, and so popular did it become that all the leading countries were soon engaged in promoting it. The new processes not only rendered useless hundreds of iron establishments which had been called into existence by the wants of new railroads and the exigencies of war, but they gave to the world products of greater durability than iron at approximately the same cost, thus decreasing the demand for iron ore, coal, and other raw materials which are common to the manufacture of both iron and steel. They did more than this; they almost wholly destroyed the large demand that had existed for years for finished iron and for heavy iron machinery for the construction of blast furnaces and iron rolling mills.

These four causes of depression have operated with almost equal force in countries engaged in war and in countries which were not so engaged—in countries which had an inflated currency, and in countries which did not have it—in countries largely engaged in manufactures, and in countries only slightly engaged in them. But of all the countries visited by the hard times of the past few years those least injuriously affected, and possessing to-day the brightest prospects for an industrial future, are the two which have most protected their home industries—the two great republics, France and the United States.

### PRESENT CONDITION OF THE EUROPEAN IRON TRADE.

After the Austrian panic of 1873 the building of railroads in the Austrian Empire received a severe check, the production of pig iron and iron rails materially declined, and the imports of all iron and steel also greatly declined. The Bessemer steel industry of Austria has been very slowly developed, but its development has almost sufficed to destroy the Austrian iron rail trade. In 1875 the country had not recovered from the depression which began in 1873.

The results of the business depression have been far more disastrous in Germany than in Austria. For about two years after the close in 1871 of her war with France, Germany was prosperous. Labor was in demand, and wages and prices advanced. But in 1873 symptoms of a decided reaction were manifested, and in that year the pros-

perity of the German iron and steel industries culminated, and it has since continued steadily to decline. This reaction would not have been so severe as it has been if the German government, in an excess of generosity which is unaccountable, had not at the beginning of 1877 removed all duties on foreign iron and steel, thus increasing the severity of foreign competition at a time when domestic manufacturers of iron and steel were struggling with other causes of trade depression. The depression in all manufacturing industries was supposed to be at its height in 1878. Many workmen were unemployed, and the general distress was very great, but this the government was endeavoring to alleviate.

The wonderful recuperative power which France displayed after the close of the war with Germany was illustrated in the revival of her iron and steel industries, but of late much difficulty has been experienced in maintaining the steel as well as iron establishments of France in operation, and but for the strongly protective policy of the country, which has many forms, the difficulty would have much increased, and financial and social distress would have been general. Notwithstanding the help of the government, however, many iron and steel works of France, chiefly iron rail mills and blast furnaces, were not employed in 1878. A French journal which is recognized as an authority stated, at the beginning of 1878, that "production is beyond consumption; production has been too rapid, and must wait until an equilibrium has been established." It is worthy of note that the French iron and steel and other industries were not stimulated into activity by an inflated currency, as was partly the case in Austria and Germany, but that they have reached the point of development stated by the French journalist in defiance of a positive contraction of the currency, resulting from the payment of the heavy indemnity to Germany.

The Belgian iron and steel industries were not so generally depressed in 1878 and immediately preceding years as those of Austria, Germany or Great Britain. With a great effort, and with the help of orders from the Belgian government itself, nearly all of the iron and steel works of the kingdom, with the exception of blast furnaces, were kept in operation, although many were not operated to their full capacity. It has been partly through frequent reductions in wages that the Belgian ironmasters have kept their works in fair activity, and have been enabled, as has been officially stated by the secretary to the British Legation at Brussels, "to buy pig iron in England, pay for freight, and deliver the same iron, manufactured into beams and girders, in the most central parts of England, or even in the heart of the iron districts, at a lower price than it can be made by English firms on the spot."

The iron and steel industries of Russia have not suffered from overproduction, as they have not in late years fully supplied the home market.

There have of late been many financial failures in the ranks of Swedish iron and steel manufacturers, and many works have been closed. I can see but little prospect for an improvement in the Swedish iron and steel industries, and none whatever so long as the Swedish tariff remains as it is.

The tide in the prosperity of the British iron and steel industries has ebbed with the refusal or inability of other countries to buy British iron and steel in the large quantities that were a few years ago required. The exports of these products have steadily declined. As a result of this decline, many of her blast furnaces and rolling mills have been closed, and not a few of their owners have been bankrupted. The iron rail trade of Wales and Cleveland has been pronounced by British writers to be "dead." The struggle for existence is so severe in the British pig iron trade that the Cleveland ironmasters have made serious inroads upon the pig iron trade of Scotland, having supplied Scotch consumers with 303,176 tons in 1878, and it is announced that they "are prepared to make further sacrifices to keep up the deliveries into Scotland."

Nor is the Bessemer steel manufacture of Great Britain prosperous. It is suffering today from over-production. In destroying the British iron rail trade it is not clear that it has not commenced to prey upon itself. Competition between the owners of Bessemer establishments have been virtually closed. One result is certain to follow the severe struggle that is now in progress in Great Britain: not only iron rails, but also all forms of manufactured iron, even crucible steel of British manufacture, must be driven more and more from British and foreign markets.

In the undue development of British manufacturing industries and in the subsequent misfortunes which have overtaken them an inflated currency has had no part, and until recently a protective tariff has had no friends.

### THE PRESENT CONDITION OF LABOR IN EUROPEAN COUNTRIES.

Inseparably connected with the condition of the iron and steel and other manufacturing industries of Europe is the condition of European labor. In proportion as these industries have been depressed, so has labor lost its opportunities or gone without sufficient reward. The number of the unemployed, and of those who earn a precarious subsistence in employments to which they are unaccustomed, is in most European countries larger than has been known for many years, and is especially large in Germany and Great Britain. But for the maintenance on the Continent of large standing armies, which withdraw many thousands of skilled and unskilled workmen from competition with their fellows, the number there would be so great as to endanger the public peace. A few illustrations will suffice to show the present condition of European labor in both manufacturing and agricultural districts, but particularly in the former.

At Creusot, where the highest wages on the Continent are paid to ironworkers, the net wages of puddlers in 1878 were about \$2 a day, and helpers received about 75 cents. The average annual earnings of French colliers in 1872 were only 980 francs, or \$189.14, and their earnings are now still



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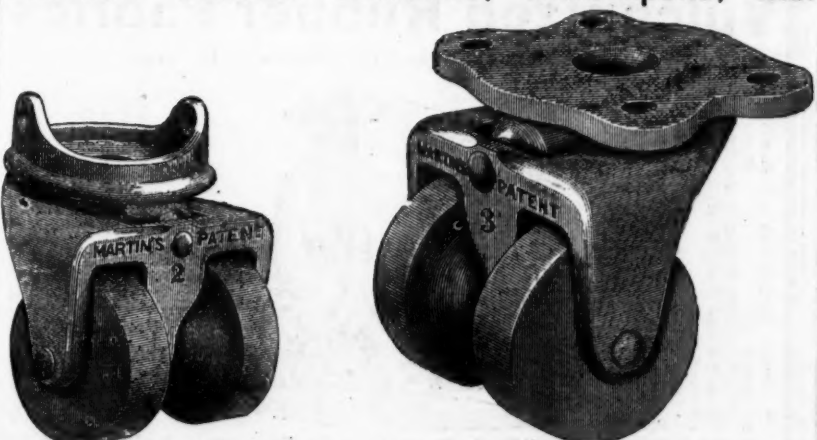


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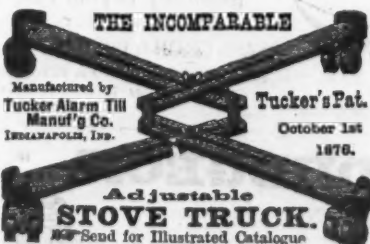
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less. A recent consular report to our own government places the average daily wages in France at 45 cents, and the amount of the annual revenue of a representative French family, composed of father, mother, and five children, one of which is old enough to work, at \$179.20. Its average annual expense is estimated at \$167, or \$3.21 a week.

During the first half of 1878 the average daily wages of colliers in Belgium were 2.86 francs, or 55 cents, per day, which was a decline from 3.08 francs a year previously.

In Russia the wages of a peasant usually range from 14 to 37 cents a day, and the wages of his wife or daughter from 7 to 14 cents.

The Austrian State Railways employ over 12,000 men, women and children. The wages of the men vary from 36 cents to \$1.09 a day; the average wages paid to the women are 20 cents a day, and to children 16 cents a day.

In Westphalia, in Germany, the wages of general workmen in iron and sheet work were in 1875 were \$4.50 a week, and the wages of day laborers were \$3.80 a week. Agricultural laborers throughout Germany received from 31 cents to 53 cents daily in 1878 if men, and if women about one-third less.

In Italy the average wages of masons, carpenters, smiths, and other mechanics are about 65 cents per day of 12 hours, the minimum being 50 cents and the maximum \$1.20. Ordinary laborers on government railways are paid from 50 to 60 cents a day. Agricultural laborers throughout Italy receive from 25 to 40 cents a day, without board, except in harvest, when they are paid from 60 to 70 cents per day of 15 hours.

In Great Britain the wages of labor have been repeatedly reduced during the past few years, and every week brings us telegraphic intelligence of still further reductions. In October, 1878, the earnings of Scotch miners averaged 2/9 a day. In Durham the price now paid per ton for mining coal is 1/10, and in 1871, before the rise, the price was 2/ a ton. Notwithstanding this reduction, notice of a still further reduction of 20 per cent. has been given to the Durham miners, and the surface laborers at the mines have been notified that a reduction of 12 1/2 per cent. will be made in their wages, coupled, however, with a reservation that the wages of able-bodied men shall not be brought below 2/6 or 61 cents a day. In the iron-mining industry in the North of England, wages which in 1871 were fixed at the rate of 11d. per ton rose to 1/4 per ton in 1873, and have now fallen to 10d., from which it is probable that a penny per ton will shortly be taken. The price of puddling in England is now 7/6, or \$1.82, a ton, and about one-third of this sum the puddler pays to the helper. Much destitution and suffering have prevailed among British workmen and their families in consequence of the reductions in wages which have been noted, but the full force of the existing hard times in Great Britain has fallen upon the tens of thousands who have been thrown out of all employment and denied any wages.

In all European countries women are engaged in many masculine employments, and children in employments to which they are unsuited. Of 5887 persons employed in the iron mines of Sweden in 1876, there were 421 women and girls. At Creusot and other French iron works women perform a large part of the labor about blast furnaces and above ground at the coal mines. All the work at the coal washers is done by them, and they are also employed in wheeling coal. French women work in the fields, performing the labor of men, and in some of the cities of France they may be seen cleaning the streets, digging cellars, and doing other work which in our country is only performed by men. Women and children, both boys and girls, work about Belgian blast furnaces, wheeling coal and ore, and also work in the coal mines. The government recently refused to exclude women and girls from the mines, but fixed the minimum age of boys working in the mines at 12 and that of girls at 13 years. In Italy, Austria and Germany women work as regularly in the fields as do the men. In Wales they engage in many laborious outdoor employments. In England thousands of young girls are still employed in carrying clay in the brickyards. It will readily be inferred that the food and clothing, and household comforts of the family of a European workman are not such as the families of our well-to-do American mechanics and farmers are accustomed to. A condition of society which requires such sacrifices and imposes such privations is not desirable in this country.

**AMERICAN COMPETITION IN FOREIGN IRON AND STEEL MARKETS.**

A study of the present condition of the iron and steel industries of Europe and of the condition of European labor naturally leads to the inquiry whether the iron and steel manufacturers of the United States can compete in foreign markets with industries so depressed and with labor so poorly rewarded, and to the further inquiry whether they could hold possession of the home market if the protection now afforded by duties on imports were withdrawn. It is clear to me that if the crude and coarse forms of iron and steel be considered, such as pig iron, bars, rails, plates, sheets and beams, neither of these inquiries can be answered in the affirmative.

It is well known to every well-informed person that the prices of iron and steel in this country never were so low as they are to-day, and that these low prices are the result of the severest home competition which has ever been experienced. With the knowledge of this severe competition and its effects before us, it is not a reasonable supposition that prices can go much, if any lower than they now are. And yet there are many countries in Europe in which both iron and steel are made much more cheaply than in the United States. Competition in these countries has been as severe as in this country; bankruptcy has followed bankruptcy; wages, always lower than in the United States, have been reduced and reduced again. Special natural advantages, joined to low wages, have combined with a slackening demand to bring the prices of iron and steel in Europe down to a level which has never before been reached.

Among the natural manufacturing advantages referred to, cheap transportation is most prominent. In the United States our best ores are found at long distances from the fuel that is needed to smelt them; much of the pig iron manufactured is necessarily made at long distances from the works which refine it into finished iron and steel; and even the finished product is usually transported hundreds of miles before it reaches the consumer. In Europe the ores and fuel are usually found in proximity to each other and to finished iron and steel works, or can be cheaply transported. The territorial extent of the leading manufacturing countries of Europe is small indeed when compared with the wide extent of our own country, and the mineralogical riches of Europe are distributed with remarkable evenness. Hence railroad transportation is not there the tax that is in this country, and canal and ocean transportation still more cheaply serve the European manufacturer by bringing to him raw materials or taking his finished product to a market. It is a fact which the books of leading manufacturing companies will verify, that fully one-third of the cost of all the finished iron and steel that are made in the United States is created by unavoidable railroad transportation. If it were possible to make iron and steel in this country without paying this tax to the railroads, there are few railroads that would pay a dividend to their stockholders, and the building of new railroads would practically cease, for all our leading railroad companies derive a large part of their revenue from the transportation of the ore, coal, coke, limestone, pig iron, and finished iron and steel used at or produced by our iron and steel works. With the cost of transportation reduced 50 per cent., and the price of labor reduced to the European standard, this country could make iron and steel as cheaply as Europe, but neither result is possible, and neither is desirable.

We will doubtless continue to increase our exports of such products as hardware, edge tools and light specialties, in the production of which American ingenuity has given us an advantage; but bulky iron and steel products, which are manufactured with materials and by the employment of skill that Europe possesses in common with ourselves, we cannot export in appreciable quantities, even to our nearest neighbors. A reference to the statistics of American exports will show that we cannot. Our iron and steel manufacturers will do well to abandon the hope that such a result is possible. The statesmen of the country need not look for these manufacturers to swell our foreign commerce with their products. The home market is all that they can supply under existing conditions, and in supplying it with good iron and steel at the lowest prices ever charged to American consumers, they will find sufficient employment for all their energies, and perform a service to their countrymen far greater than could follow an uncertain struggle with overcrowded countries for the supply of foreign markets.

I trust that no man, be he statesman or manufacturer, will be deluded with the thought that our most formidable rival—Great Britain—will cease her efforts to regain possession of our home markets. Her manufacturers of cotton, woolen, iron, steel and other products are forcing labor to accept as low wages as are paid in the poorest country on the Continent of Europe, and with the many natural and acquired manufacturing advantages which they possess, they will in a little while set at defiance the manufacturing advantages of all other countries. Temporarily under a cloud, because of the progress made by other countries in developing their own resources, or because of their financial inability to continue the large orders once given to her manufacturers, Great Britain will make a desperate effort to emerge from it by seeking to undersell the whole world. Against this fresh assault most Continental countries, and some British colonies, will defend themselves with protective tariffs, and if this country would not see many of its leading industries overthrown, it must resolutely adhere to the revenue policy which has developed those industries, and which is enabling the country to-day to enter with hope and confidence upon a new era of prosperity.

### Iron Tubing for Refrigerator Cars.

The National Tube Works, of Boston, have of late commenced the construction of Tiffany refrigerator cars, built with a framework of wrought-iron tubes and steel rods, by which means the weight of the car is considerably diminished and longer life secured. The framework consists of four iron sills to a car, each sill being constructed of three two-inch iron tubes or pipes, and the four sills are bolted together with steel rods running across the car every 16 or 18 inches. The sides and top of the frame are of steel rods running crossways and longitudinally, and firmly bound together. This substantially forms the framework or skeleton of the car. The Tiffany system of refrigeration includes wooden sheathing within and without, and the principle consists of three dead air spaces between and throughout. These air spaces have an additional protection by being paper lined. The doors are double, and have india-rubber bearings to make everything air-tight. The ice chamber is on top, the car being nearly two feet higher than an ordinary freight car. The external appearance of these cars is not unlike other refrigerator cars, except that the iron sills referred to are not sheathed in with wood.

As has been said, the refrigerator cars referred to in this article are the first that have ever been built with iron tubes and steel rods as a framework; but for three or four years past flat and box freight cars, built by the National Tube Works Company, have been in use. This make has since been introduced more or less on quite a number of railroads in New England and other parts of the country with substantial success. Statistics compiled from reports to the Railroad Commissioners of Massachusetts from 1872 to 1876, inclusive, shows that the average repairs on freight cars of eight roads centering in Boston were over \$75 to a car yearly. This expense would be largely saved by the substitution of iron in car construction,

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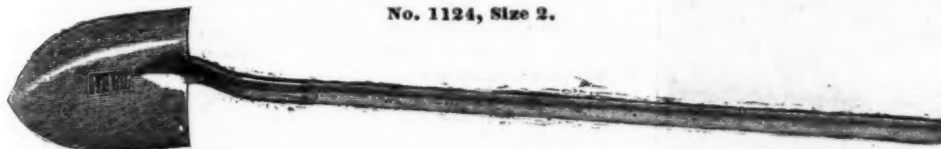
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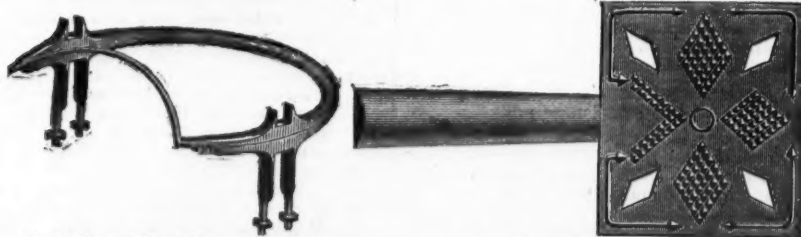


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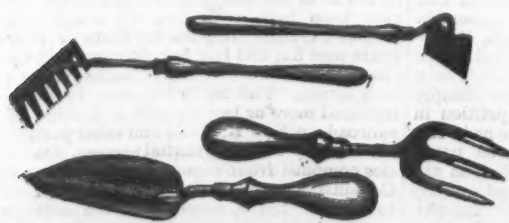
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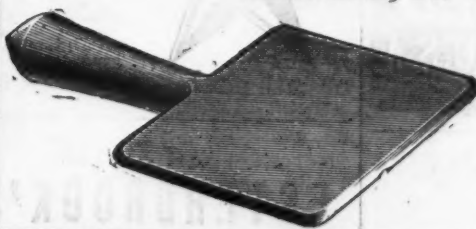
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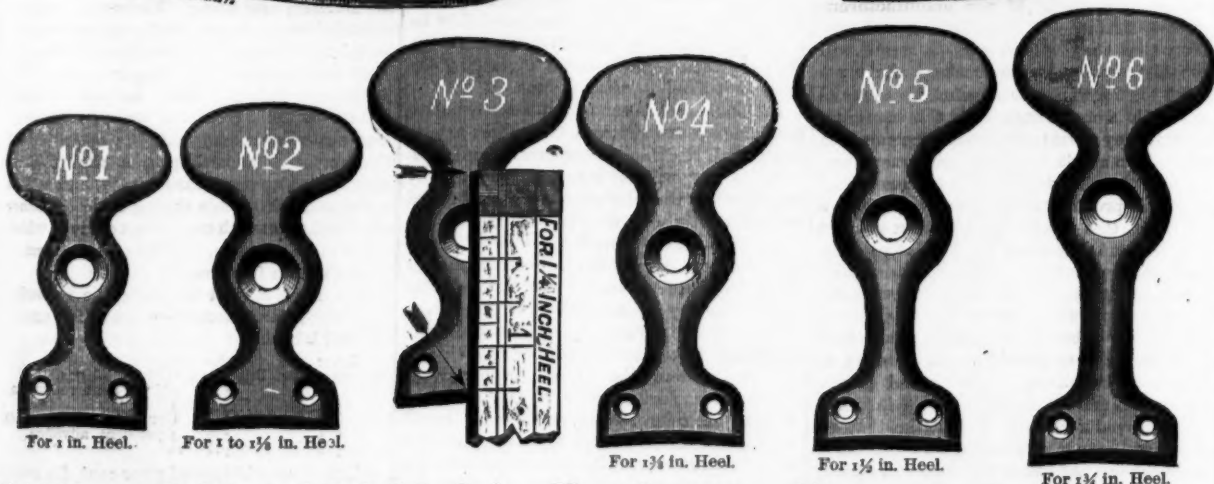
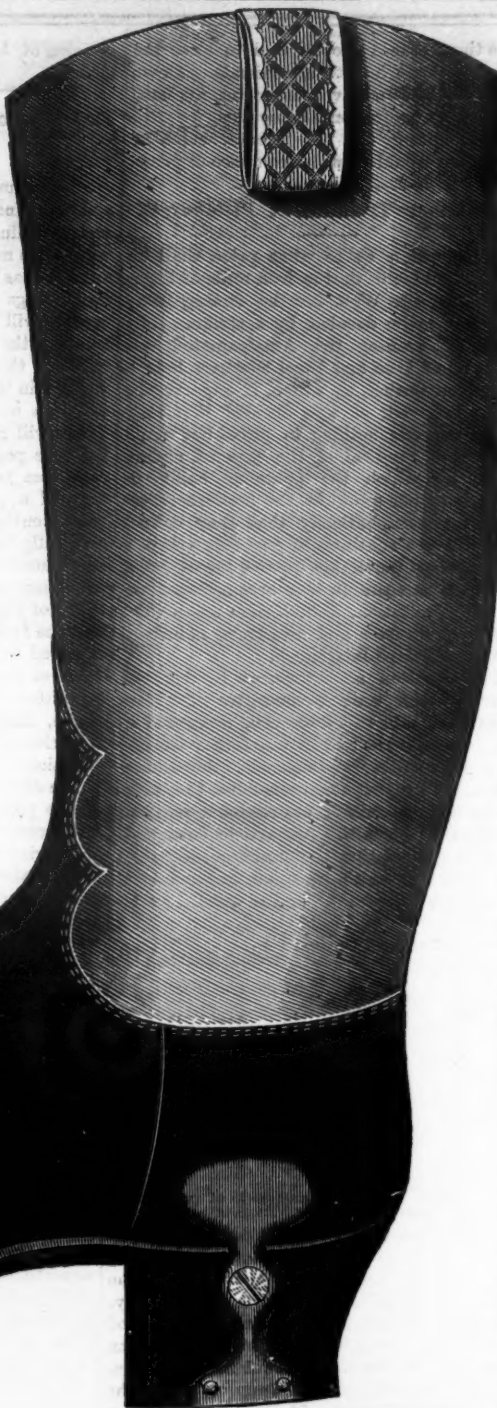
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## Combination vs. Competition.

The Boston Commercial Bulletin of the 10th inst. contained the following statement:

"The tack manufacturers are beginning to find that combination, when carried to its legitimate results, is not so profitable as they had supposed. For years they have formed a strong organization dictating terms to consumers; but their tactics have been borrowed by their workmen, who have excluded apprentices and jealously guarded the secrets of the business. Now that the profits of the manufacturers' arrangement have departed, the men refuse to go back to ante-panic wages, and threaten a general strike."

This has brought out the following reply from a prominent manufacturer, which will be read with interest:

"Referring to your brief article of May 10, concerning a former combination among the manufacturers of a staple line of hardware, I beg to call your attention to the fact that their organization was not an exceptional one. In most lines of standard hardware, where facilities of supply largely exceed the export and domestic demand, experience and a practical knowledge of the business have forced manufacturers to the conclusion that combinations are a necessity in order to 'live and let live.'"

"Notice the organizations of manufacturers of wood screws, cut nails, cordage, tubes, horse-shoe nails, bolts, common locks, copper and brass manufactures, &c. Although these several associations differ in their forms and methods, still they are all governed by the same principles, and are substantially the same. Yet none of them have for their object the 'fleeing of the public,' and much less the dictation of arbitrary terms to customers, whom it is their interest to serve and to please; but primarily, and above all, they seek to regulate production and avoid reckless competition."

"Combinations, like more public bodies, are not always governed by the wisest counsels, but on the whole they are well conducted, and tend to the benefit of members of the trade (buyers), and the community at large. The necessity for such organizations in some of the lines mentioned seems too obvious to need illustration. Notably is this the case with screws. The American Screw Company alone have a capacity sufficient to supply the demand of the entire country. In tacks, statistics prove that less than half the number of machines now operated in the United States, if run 60 hours weekly, would produce a surplus over the legitimate wants of the trade. In cut nails and cordage business is equally overdone. In horse-shoe nails, common locks, curry combs, and many other like articles the same state of affairs exists. Therefore without an agreement (or combination, if you please) to be mutually forbearing, the outlook for these manufacturers is indeed discouraging. They have not the advantages of makers of 'specialties,' for in staple manufactured goods the 'makers' of the best manufacturers are often so much alike that it is impossible to tell which is which, thereby enabling one reckless manufacturer to establish prices for a dozen competitors who endeavor to be prudent."

"If in the event of no combination, the 'survival of the fittest' is contended for, it becomes not so much a question of economy, as might naturally be supposed, but of the 'deepest purse.' Finally, when a majority of the manufacturers are compelled (from prudence, or exhausted means, or other causes) to stop their machines, the 'survivors,' tiring of warfare, advance prices, hoping to regain their losses. But how does it work? Immediately the idle machines start up again, many under new management, and to recover an outlet for their product 'cut' prices again, until soon all are selling below cost as before. And this will continue over and over again, so long as facilities for production largely exceed requirements."

"The remedy is plain enough, I confess, but the difficulty is to enforce it. Sad as is the commentary on human nature in general, and certain classes of manufacturers in particular, yet it is nevertheless true that moral courage to let a customer 'go' when he can buy lower of a competitor, even at a loss, is extremely rare. Hence combinations which cultivate a healthier sentiment in this regard."

"As to the general effect of combinations, such as those referred to, organized under the conditions and for the purposes which I have named, they seem to me desirable on many grounds."

"1. They promote the welfare and prosperity of the industries fostered by them, thereby rendering a benefit to the State."

"2. They enable the manufacturer to obtain fair returns on his investment."

"3. They give the workman steady employment, and enable employers to pay fair wages (and better for the workmen are curtailed hours of labor by the year than occasional 'full time' by the week)."

"4. They stimulate manufacturers to make better goods, that the inducement of superior excellence may be offered buyers, in lieu of 'cut' prices."

"5. A prosperous manufacturing business conduces to the prosperity of the place in which it is located."

"6. Dealers are benefited in being assured uniform prices, knowing the lowest, and enabled thereby to obtain a profit. (Without a combination a buyer of \$25 value often obtains his goods as low as the buyer of \$1000 value, to the detriment of the large dealer and the manufacturer as well.)"

"7. Large consumers are benefited by having stability in an important item of cost."

"8. Small consumers are usually indifferent as to prices, as they obtain their goods at least as low as their competitors, which is the principal desideratum to them; and unless prices are unreasonably high (a rare thing), the few additional pence paid by the small consumers are no hardship to them; but, considered in the light of offsetting advantages, really retroact to their benefit."

"An argument is frequently made against combinations that they may, if they will, establish high prices; that they become insatiable through their opportunities, and often obtain inordinate profits. But, as I

said above, this is exceptional, and generally results to the disadvantage of those who sanction it. The fear of encouraging new investments in the business is alone sufficient to deter manufacturers from seeking more than fair returns on their investments, thereby protecting the public, if need be, from being charged undue profits."

"But, after all, much as combinations are desirable, such is the jealousy, prejudice and perversity of some manufacturers, that it is extremely difficult to persuade them to 'bury the hatchet' and 'agree to be good.' Often they wait until bankruptcy stares them in the face, and some even prefer bankruptcy to affiliation with a 'hated' competitor."

"But manufacturers of the staple articles above named, as a class (i. e., the great majority who rule, not by might, but by force of intellect), believing in earnest, enterprising, legitimate competition, in the attainment of every excellence in the quality of their goods, in improving the methods of manufacture, in conceding the advantages of merit to the meritorious, in making our market the supply market of the world, deem these objects, their own interests and those of the public, best subserved by mutual harmony, co-operation and agreement (this under the name of association or combination, as you please.)"

"In conclusion, permit me to say in relation to your remarks that the Taunton strikers learned their tactics from their employers, that you have been misinformed, as their union antedates that of the late organization of their employers. But I will not discuss this labor question now, as I have already written much more than I intended."

"The expediency of combination is a matter of very deep importance to the manufacturers, whose business is now unprofitable without it; and your views and the views of others on the subject, would please and interest a very large number of your readers."

## Shipping Dynamite and Nitroglycerine.

The recent explosion of dynamite in transit in Canada, will make the following statement by Mr. Geo. M. Mowbray to the Ottawa Citizen, one of general interest, as showing the measures taken there to prevent the occurrence of similar disasters:

Under a penalty of \$5000 and not exceeding 5 years' imprisonment, all packages containing nitroglycerine or any compounds thereof, must be legibly marked on three sides, "nitroglycerine, dangerous." Notice of the contents of any such package must be given to the freight agent, that the packages contain nitroglycerine or some mixture thereof. The method of packing, so as to absorb any oozing out, is prescribed. Nitroglycerine can only be transported in a car either provided by the railroad company or by the forwarder, specially fitted so as to maintain the explosive in a congealed state, and a messenger from the forwarder or consignee must ride in the car with the explosive. Since these regulations have been in force there have been no accidents, and if the manufacturer be careful not to surcharge his composition with nitroglycerine, so that it does not ooze out, explosion is impossible. Very large quantities of these explosives have been moved without the slightest accident during the past 12 years. In 1867 it was discovered by accident that, when congealed, a fulminate may be exploded in a cartridge of nitroglycerine without exploding the nitroglycerine itself. Now, since the nitroglycerine congeals at 45° F., ice at 32° F., the latter furnishes a cheap and ready means of reducing it to the non-explosive state; a properly constructed refrigerator car will maintain 10 tons in that condition for a month, with an expenditure of 5 tons of ice. The railways leading to the coal regions of Pennsylvania fix certain days, say the first of the month, to receive explosives, and the quantity consumed in sinking shafts has been enormous. Contractors cannot remove hard rock at present competitive prices, except by means of these explosives. While a spark will explode a keg of gunpowder, nitroglycerine and its compounds require a shock (best given by means of a fulminate); but when these compounds of pure nitroglycerine are congealed and maintained in that condition, they are no more dangerous to transport than soap, lard or butter. Shock will not then explode them, and flame is incapable of causing an explosion. To debar the contractors of Canada from the economy of these modern explosives by prohibiting transportation would be an error, and cupidity would evade the law."

## The Melbourne Exhibition Building.

The Melbourne Argus gives the following description of the building in course of erection for the coming exhibition in that city: The salient features of the building (which will be the largest Melbourne has yet known) will be, first, a dome higher than the highest spire in the city, flanked by a number of smaller towers of pavilion shape; and, secondly, a variety of ornamental details, mostly in such high relief as to utterly deface the dead-wall effect but too frequently conveyed under similar circumstances. The building, excluding the temporary annexes for machinery, &c., is cruciform, consisting of a nave 500 feet long, running from east to west, and cut through its center by a transept 270 feet deep, the ends of which are north and south. This transept is the leading feature of the fabric. At its south end is the chief portal—a tall arch, 40 feet wide and 60 feet high, deeply recessed, and reached by a flight of broad stone steps. On each side are square towers, 105 feet high, adorned by picturesquely shaped and well-grouped windows, together with Ionic pilasters and enriched panels. The north end of the transept is arranged on almost precisely the same pattern. Some 50 feet behind the portico, and at the point where the transept intersects the nave, rises the dome, octagonal in form, and reaching the height of 223 feet, being about 130 feet above the main roof. As the dome rises itself above the main roof it is surrounded by columns, dividing groups of windows, and just above that point the tower gradually begins. At its base the central tower is 100 feet square, but as its octagonal shape becomes defined the diameter is contracted to 60 feet,



# The Iron Age

AND  
Metallurgical Review.

New York, Thursday, May 22, 1879.

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JAMES C. BAYLES, Editor.  
JOHN S. KING, Business Manager.

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A fresh example both of the folly of strikes and the inconsistency of those engaged in them, is found in the action of the glass chimney blowers of Pittsburgh. Months ago—how many we do not recall—these workmen struck against the introduction of a labor-saving machine known as a "patent crimper." For over a year this strike continued, and at last the workmen, after all their losses, have resumed work on the terms originally proposed by the manufacturers. This, of itself, is evidence of the folly spoken of; but it is stated that a number of the striking workmen went to Chicago and worked at the same rate, and for the same parties, that they refused to work for in Pittsburgh. In other words, two of the chimney manufacturers against whom the strike was established have works at Chicago, and the striking workmen went there and worked at the rates against which

they struck. After more than a year the strike has ended, and they return to Pittsburgh to work at the prices offered. It certainly seems strange that men of the acuteness and intelligence of many of our American workmen, will pursue a course that has been so devoid of sense and reason as this strike. It was, in its inception, a strike against labor-saving machinery—a fight against the inevitable.

## Alexander Lyman Holley.

The tributes paid to the personal worth and professional services of Mr. A. L. Holley, at the Pittsburgh meeting of the American Institute of Mining Engineers last week, were so spontaneous, and expressed so truly the feelings of all who know this remarkable man well enough to understand why he is so dear to his personal and professional friends, that we venture upon a task which, though somewhat unusual, is in this instance peculiarly agreeable—that of recounting a few of the great services which this able and conscientious engineer has rendered the country, in promoting the development of the steel industry in the United States. Though in the prime of life, Mr. Holley has witnessed changes in the theory and practice of metallurgy which, in an earlier era of civilization, would have been the work of centuries. To stand first among the ten or twelve men who have made the manufacture of Bessemer steel the great success it has become in this country, is an honor of which any engineer might be proud. This position is accorded to Mr. Holley by those who have worked with him, and a brief tribute to his worth and his work may properly accompany the report of the Pittsburgh meeting of the Institute of Mining Engineers, which will be found in another place in this issue.

Under the management of Mr. Holley, who, when in England in 1862 and 1864, recognized the value of, and succeeded in purchasing the patent rights for, the Bessemer process, the Troy Works were started on an experimental basis. He subsequently designed and assumed temporarily the management of the Pennsylvania Steel Works, and then, in 1868, reassumed his former duties in connection with the Troy Works, which he remodeled in a great degree. His next step in the development, or rather the next establishment which may be regarded as the embodiment of the preceding years of careful labor and unceasing application, were the works of the North Chicago Rolling Mill Company. This was in the next year followed by the erection of the Bessemer establishment of the Joliet Iron and Steel Company, and jointly with Mr. John Fritz, Mr. Holley elaborated the designs for the plant of the Bethlehem Iron Company. For these, as well as for the Edgar Thomson and the Lackawanna Iron and Coal Company—the two last works built—Mr. Holley acted as consulting engineer. There is hardly any one department of American Bessemer practice which does not bear the imprint of Mr. Holley's mechanical genius, every effort of which was directed to the attainment of that wonderful output, coupled with the utmost of precision and economy of manipulation, which has placed the American type of Bessemer plant almost without a rival in the world. As an instance of the rapidity of this development, it may be of interest to recall a statement made by Mr. Robert W. Hunt, that in 1868 Mr. Holley proclaimed that at last his dream was realized; the Pennsylvania Works were making eight conversions per day, producing 40 tons of ingots in 24 hours! In 1878 almost ten times that amount was reached. This has been attained both by a thorough adaptation of the general disposition of the machinery to the requirements of the process, and by numerous and momentous improvements and elaborations of detail. Among the fruits in the first direction are the adoption of a shallow instead of a deep pit, the introduction of an accumulating ladle placed on scales, the use of three top-supported hydraulic cranes, and the placing of the converters and the melting cupolas in such a position as to secure facility and rapidity of work, manipulation, repairs, ventilation and transportation. Among the most prominent improvements of details has been the invention of the movable converter bottom, which has done much toward the attainment of the present enormous number of heats, and the modification of the melting cupolas, which has contributed largely to the same end.

Mr. Holley has always taken a prominent part in all discussions pertaining to the metallurgy of steel, as his numerous contributions to the American Institute of Mining Engineers, of which he has been president, and to American and English technical journals and societies, testify. More recently he has added much of value to the literature of the manipulation of phosphoric steel and the modern modifications of the open-hearth steel process, while his labors during and in connection with the Centennial Exhibition, will long be remembered by foreigners as well as Americans.

Mr. Holley is one of the most revered of men, and it remains for his friends to make known the value of the great services he has rendered the metallurgical industries of the country. In this article we have but briefly recounted that part of his life work which has been most conspicuously useful. In his private relations he is a man of rare graces, and the physical suffering which for years has tortured him seems but to have

made those graces sweeter and to have the more endeared him to his friends. As we speak not for ourselves alone, but for hundreds of his professional associates, we need offer no apology for this tribute, which he of all men would least desire to see in print.

## The Labor Troubles at Pittsburgh.

The question as to what price shall be paid skilled labor in the iron mills of Pittsburgh and the West for the coming year, bids fair to be decided by a strike. Last Saturday evening the Amalgamated Association of Iron and Steel Workers held a secret convention, at which, if reports are to be believed, it was decided that they would concede nothing in price, but would demand a renewal of the present sliding scale, by which the price of boiling is fixed at \$5 per ton. As the manufacturers state most emphatically that they cannot and will not continue to pay this price, a strike seems inevitable on the 1st of June, at which time the present arrangement expires by limitation. If both sides mean what they say, a bitter and disastrous industrial conflict is before Pittsburgh.

The situation at Pittsburgh is this: A year ago this time a committee of boilers from each mill in Pittsburgh, presented to the owners of the mill in which they worked what they call a "sliding scale," demanding the signature of the owner to the same under a threat, either expressed or implied, of stopping his mill. An article so signed, in whose formation the manufacturer had no part, and which he signs under duress, is called a "contract," and is worded as follows:

When card rates of bar iron are—	Per ton.
2 5-10 cts. per lb.—boiling shall be \$5.00	5.10
2 6-10 " " " " " " " "	5.20
2 7-10 " " " " " " " "	5.30
2 8-10 " " " " " " " "	5.40
2 9-10 " " " " " " " "	5.50
3 1-10 " " " " " " " "	5.60
3 2-10 " " " " " " " "	5.70
3 3-10 " " " " " " " "	5.80
3 4-10 " " " " " " " "	5.90
3 5-10 " " " " " " " "	6.00
3 6-10 " " " " " " " "	6.10
3 7-10 " " " " " " " "	6.20
3 8-10 " " " " " " " "	6.30
3 9-10 " " " " " " " "	6.40
4 " " " " " " " "	6.50

The above agreement and scale of prices shall continue until the 1st day of June, 1879.

This "contract," it should be noted, is made between each manufacturer and the men in his employ, and not between the union and the manufacturers as a body, though, of course, it is well understood that the union is back of it. It is on the demand for the renewal of this "contract," which expires June 1, that the struggle will come. If the manufacturers refuse to sign it—and they declare most positively that they will refuse—a strike will probably ensue. At the meeting above referred to, the workmen appointed a committee to hold a conference with the manufacturers if they should ask it, but the committee were not to ask it under any circumstances. This may be an evidence of weakness or of strength—probably of the former, for it is a fact that the union was never in a worse condition to endure a strike than at present. The president has been East for a number of weeks, trying to organize lodges of the union and to get assistance, but has utterly failed. At Johnstown he was sent about his business very speedily. At Altoona he succeeded in forming a lodge and getting the men to make a demand for an increase, but it proved a failure. The strike that resulted soon came to an end, and the union was broken. At other points he was equally unsuccessful. He found a bitter feeling among the workmen at what they regard as bad faith of the union toward them in the past.

If a strike does result, it will be the most extensive one ever known in Pittsburgh. Most of the strikes heretofore have been of only one trade, as the boilers, or rollers or nailers, the balance of the men keeping at work. As all classes of labor are now organized in one union, instead of each having its separate union, as heretofore, if a strike occurs it will entirely close the mills. Boilers, heaters, rollers, nailers and all will go out. While this will throw more out of work, it will tend to shorten the struggle. The idle men will be deprived of the aid they have heretofore received from those at work, and will be thrown upon their own resources and those of the union. It is true that the workmen, in accordance with orders received from the union some months since, have been saving what of their earnings it was possible to save, and will thus be somewhat better prepared to stand a struggle; but when a man has once saved anything he is loath to let it go.

We have so often criticised the course of Fernando Wood, and of the Ways and Means Committee under his leadership, in dealing with the tariff question, that we regard it as a privilege to recognize the genuine service they have done the country in refusing to consider this question during the present session of Congress. The business interests of the nation are heartily sick of the agitation of any subject that disturbs the present relations and throws an uncertainty over the future; and though we do not believe that the committee could have succeeded in any attempt to materially modify the existing tariff laws, the attempt and consequent discussion would certainly have had a depressing effect, especially in the iron business, and just at a time when any extra burdens would be hard to bear. We congratulate Mr. Wood that the stand he took early in the session has resulted in the

decision of his committee to let the tariff alone.

## The "Basic Lining" for the Bessemer Converter.

The summer meeting of the British Iron and Steel Institute, to which all ironmasters and metallurgists have been looking forward with much interest, and perhaps some anxiety, has just come to hand. Our readers will find on another page careful extracts of the papers read on the engrossing topic of the day—the dephosphorization of pig iron in the Bessemer converter, with the aid of a basic lining and basic additions. There will be, no doubt, some disappointment that the paper on the Thomas-Gilchrist process does not contain sufficient additional data of a practical character to determine some doubtful points, and that it does not give fully the results of at least a few days' continuous working on a large scale. The whole iron and steel trade has been on the tiptoe of expectation, and it is only natural that the fact that experiments such as those involved require long and laborious work was lost sight of. Nevertheless, the papers submitted—those of Messrs. Thomas-Gilchrist, Snellus and Riley—deserve careful attention, and will give a better idea of the situation.

The discussion which followed the reading of the papers, for a remarkably early and full account of which we are indebted to the enterprise of the *Ironmonger*, brought out much valuable criticism and many important suggestions. One of the most notable statements made during the discussion was that by Mr. Richards, who said that the cost of the basic brick did not exceed that of ganister. As regards its durability, Mr. I. Lowthian Bell very forcibly pointed out that the function to be played by the lining was inconsistent with its operation as an eliminator of phosphorus. He did not agree with another speaker, who feared that a failure to obtain good work regularly might prove a serious drawback, as he thought that even if the metal from some exceptional blows did approach the limit of 0.2 phosphorus, which all the analyses published failed to reach, the difference in price of the phosphoric steel would render it valuable nevertheless. He considered the addition of basic materials to be probably indispensable to success, but believed that the presence of a considerable quantity of oxide of iron was absolutely necessary, and that it might prove cheaper, as he held it to be as good an absorbent. In this he was sustained by Mr. Pourcel, of Terre Noire, who stated that he attributed the dephosphorization rather to the presence of oxide of iron, formed by the process of blowing, than to lime.

Dr. Siemens also thought it was a question how much oxide of iron was necessary to accomplish the dephosphorization, and how much of that oxide of iron was produced by overblowing the charge. He apprehended some difficulty with the renewal of the lining, while others considered the increased loss of metal during the process, a matter worthy of serious consideration. In order to prevent any large quantity of iron being carried into the cinder, a large bulk of basic additions would be necessary, and this, it was hinted, would be a source of inconvenience. Mr. Parker drew attention to the danger of overblowing, which he urged would necessitate a large amount of spiegel for its correction, while Mr. Stead believed that, as an enormous heat would be required for such a considerable amount of fluxes, some difficulty might be experienced through cold working and the formation of skulls. As for the losses of metal, Mr. Stead differed from some members, as he thought that only 12 per cent. of the iron would be burnt, even in the most unfavorable cases, and that a yield of 85 per cent. would be got from the pig. Mr. Richards, in replying, stated that a simple means for insuring regularity of work would be sampling and testing under a hammer. Mr. Gilchrist took exception to the term "overblowing," for which he proposed to substitute "afterblow," as its object was only the removal of the metalloids. He stated that there was no difficulty in making repairs.

The most important issues raised in the course of the discussion were, therefore: First, the question as to the necessity of the basic additions to preserve the lime lining from rapid wear; secondly, the importance of the lime as a constituent of these basic additions, in which respect there is conflicting testimony, some holding that oxide of iron alone could do the work as well and cheaper. One important point seems to be conceded, the ability of the lime lining, as at present made, to resist the abrasive action of the blowing, it being only a question whether and how far it will withstand the chemical action.

We give to-day the conclusion of our report of the proceedings and excursions of the meeting of the American Institute of Mining Engineers. Its faithful record of the enjoyments and labors of those who were so fortunate as to be present will, we hope, prove an acceptable, though inadequate, substitute to those whom stern duty kept at home, while it will serve to refresh the memory of many members whom the rapid succession of events has no doubt left somewhat bewildered. A full account of the adjourned discussion on the physical and chemical properties of steel rails, will be presented in a future issue of *The Iron Age*.

## The Durham Strike.

It has been repeatedly and earnestly stated in England, by eminent politico-economic authorities, by manufacturers and by the press, that much of the present depression of industry in Great Britain is due to the unwillingness of the laboring classes to perceive the necessity of reductions in wages and bear their share of the present losses. They urge that, while they are forced to struggle with their workmen for concessions which are inadequate and follow the fall in prices slowly and insufficiently, their foreign rivals, being in harmony with their workmen, who, compared to the English, are temperate and frugal, outstrip them not alone on neutral ground, but contest with them in markets hitherto their own. These statements invest the relations of labor and capital in England with more than ordinary interest for Americans, who are now becoming the competitors of British manufacturers in foreign markets.

We briefly referred, in a recent issue of *The Iron Age*, to the war between employers and employees in the Durham coal field, and as the history of the strike now in progress shows admirably many phases of the relations of English laborers to their employers, we make room for a summary of the development of the present system in that district. The Durham miners were driven to extreme measures as early as 1810, and a second time in 1832, being victorious, and justly so, on both occasions—the latter being, by the bye, a rejection of the store system. In 1844 the miners again struck, and though they held out for almost five months, they were forced to submit and return to work on their employers' terms. Since then, until within a few months, there has not been any general suspension of operations caused by a failure to agree between colliery owners and miners. During the years 1871, 1872 and 1873 prices for coal rose enormously, and accordingly wages were increased successively by 20, 13 and 20.7 per cent., making a total advance of 53.7 per cent. Prices for coal sank again rapidly, falling from 15/10 per ton in January, 1873, to 12/8 in April, 1874, to 10/1 in August, 1874, to 6/6 in October, 1875, to 5/8 in August, 1876—the present average selling price at the pit's mouth being represented to be, by a good authority, as low as 4/7. During this decline 15 per cent. was at first given up by the miners in April, 1874, but in October of the same year 20 per cent. more was demanded by the masters, and it was in connection with this claim that the system of arbitration was first applied in the Durham coal trade. The umpire chosen awarded them 9 per cent., which was followed by successive reductions, under the same system of 5, 7 and 6 per cent. on underground labor. Both parties adhered loyally to the agreement, although neither was entirely content with the operation of the system. Accordingly, a sliding scale was agreed upon in March, 1877, and as it is a departure from this sliding scale, or rather dissatisfaction with some of its clauses, which provoked the strike, it will be of interest to give its main features.

The scale agreed to made the following provisions for prices to be paid for underground labor:

Price	Price	Wages.
At and above	But below	
5.4	5.3	7½ per cent. reduction.
5.3	5.2	Current rate (about 4.8)
5.2	5.1	5 per cent. advance.
5.1	5.0	
5.0	4.9	

and so on, an advance of 5 per cent. for every 8d. of increase in the market price of coal. All that the miners could lose as long as this scale was in operation was, it will be seen, a reduction of 7½ per cent., whether the value of coal fell far below 5/4 or not. The first returns in 1877 proved that it had actually fallen below the minimum, and the 7½ per cent. reduction went into effect. But as prices continued to weaken, this was claimed to be a very inadequate relief to the colliery owners, who at the expiration of two years, from April 2, 1877, according to a clause in the agreement, refused to renew it unless the minimum limit was abandoned. They demanded a reduction of 20 and 12½ per cent. on underground and surface labor, respectively, and rejected a proposition made by the miners to refer the whole matter to arbitration. They made, however, an alternative proposition that an immediate certain reduction in wages of 10 and 7½ per cent., respectively, should be submitted to, referring further reductions of 10 and 5 per cent. to arbitration. The miners were willing to accept 7½ and 6 per cent., respectively, and submit to arbitration for the rest, and then offered to agree as a definite settlement to 10 and 7½ per cent., provided there was no arbitration beyond that. The miners claim, as stated by Mr. W. Crawford, Secretary of the Miners' Association, that according to the figures of the accountants up to November, 1878, coals had fallen on an average for the whole country, only so much that, had the sliding scale been continued downward, a 5 per cent. reduction would be the result. The masters in reply repeated their former offer, which was rejected by the men by an almost unanimous vote. This brought about a complete cessation of communication until the masters, on the 4th inst., appointed a committee of fourteen, with powers, to settle the question at issue. By telegraph we learn that, by a vote of 18,446 to 6,362, the miners decided in favor of the formation of a similar committee. The two committees met and decided to submit the entire matter



to an umpire for final decision. The Judge of the County Court, who was chosen as arbitrator, accorded a reduction of 8 1/4 per cent. on the wages on underground, and 6 1/4 per cent. on surface labor. Three-quarters of the colliers have gone to work on these terms, but meanwhile other circumstances have occurred which give rise to the fear that this settlement will not be lasting or final. A short while before the end of the strike a call was issued by the Miners' Association to meet on the 13th inst. at Barnsley. The aim of this conference, it was stated, was to combine all the miners of the great coal producing districts of England in a movement to advance wages. This conference was actually held, and is reported to have been attended by the delegates of 120,000 men, who solemnly concluded to ask for an addition of 10 per cent. at an early date. Whether this is an idle threat or not it is difficult to estimate at the present juncture. It shows on the part of the men as uncompromising an attitude as that of the colliery owners, who, it is true, have ultimately gained a little more than those firms, like Bell Brothers, who were awarded 6 1/2 per cent. by an umpire during the course of the strike. Though temporarily settled, it seems but too possible that the dissatisfaction of both parties will soon lead to fresh complications. The great iron and steel, engineering, shipbuilding and chemical industries of the North have been seriously affected by the strike, and the constantly impending danger of a renewed conflict is not calculated to reassure the iron trade, which has been severely tried of late by such great failures as those of the Skerres Iron Works, of Darlington; Lloyd & Co. and Hopkins, Gilkes & Co., of Middlesbrough, representing in all liabilities of more than \$4,000,000.

#### The Commerce of India.

The important events now taking place on the borders of British India have brought, during the last few months, this immense possession of Great Britain once more prominently before the world, and a great deal has been written about its immediate future, its finances, &c. Our trade with India, at all times important, has been increasing rapidly since the war, and we are, therefore, directly interested in the prosperity of this great empire.

After doubling the Cape of Good Hope early in 1498, Vasco de Gama and his Portuguese landed in India in May of the same year, and after some difficulties another great Portuguese navigator, Cabral, obtained a foothold. Soon after the death of Shah Arungzeb, which occurred in 1707, the English East India Company, founded in 1600, obtained during a period of anarchy its first firm, or grant, by which the company's goods were exempted from export and import duties. While, therefore, during continual wars with the Dutch the Portuguese lost nearly all their possessions in India, the English gained their first hold upon the country quietly and without warlike demonstrations. During a subsequent period of anarchy, however, in 1748, the English and French came to confront each other, and from thenceforward a series of wars were waged by these two European nations in India, continued with intervals until the close of the last century, and ending in the undisputed supremacy of the British.

In 1813 British trade with India was, with some restrictions, opened to British subjects, and finally, in 1833, the commercial privileges of the company were entirely abolished, and when the company's charter expired some years since, the British government assumed direct sovereignty over India. The critical period which British rule in India had passed through in the meantime, during the Sepoy rebellion, in 1857, rendered it patent to all that the management of India's affairs, both civil and military, could only be carried on under a thoroughly reformed system, and the expiration of the company's charter lent a wider scope to this rule and strengthened the hands of the home government, whose power is delegated to a viceroy.

India has become of such importance to England, both from a political and commercial point of view, that outside of the British Isles it is the possession deemed most valuable; hence the immense interest which attaches to it. The country is divided into three presidencies—Bengal, Madras and Bombay—covering an area of 908,971 square miles, with a population of 191,168,400; and there are also the tributary states, with an area of 558,724 square miles and a population of 48,236,200. Total extent, 1,467,695 miles, with a joint population of 239,404,600. The Hindoo is the prevailing creed. The Mohammedans number 40,000,000, while the Christians form but a mere fraction—less than a million—of this vast population. The non-Asiatic inhabitants include: Englishmen, 75,734; other Europeans, 38,453; and Americans, 6661. There are 44 cities containing 50,000 inhabitants and upward, the most populous ones being:

Inhabitants.	Inhabitants.
Calcutta..... 595,489	Bombay..... 445,313
Bombay..... 445,313	Amritsar..... 135,813
Madras..... 397,552	Cawnpore..... 122,770
Bombay..... 397,552	Puna..... 118,880
Bombay..... 397,552	Ahmedabad..... 116,873
Bombay..... 397,552	Surat..... 107,149
Bombay..... 397,552	Bareilly..... 105,932
Bombay..... 397,552	Lahore..... 98,924
Bombay..... 397,552	Rangoon..... 98,745

India's finances are not in a flourishing condition, especially since silver declined from 61d. 18 years since, to between 48d. and 50d. per ounce in the London market. At the present value of silver the exchequer

of India loses on this item alone £3,500,000 annually, the revenue being collected in silver, while the interest on the public debt is in part paid in gold; the interest on railroad bonds, civil and military pensions, part of the English army in India, and war material being also paid in the more valuable coin. The capacity of the people at large to pay taxes, in the face of continual large deficiencies in the budget, is strained to the utmost, the bulk of the people being extremely poor. Thus the actual gross revenue in 1876 was £51,310,063, and the actual expenditure £53,911,747, which included £4,270,629 spent for public works, while the deficiency in the last financial year amounted to £3,543,087. The war in Afghanistan will of course not mend matters; the estimate for 1879-80 already includes £2,000,000 for it, and a fresh loan of £10,000,000 is spoken of as requisite to provide for further contingencies. The consolidated debt of India amounted on the 31st March, 1876, to £122,570,014, and the non-consolidated to £11,488,620; together, £134,058,644, against £130,493,285 in 1875. It is evident that the finances of India present a problem not easily solved. The debt is large as it is, and a reduction of it can only be thought of after the campaign in Afghanistan shall have terminated successfully.

The foreign trade of India has been as under, reduced to thousands of pounds sterling:

	IMPORT.	EXPORT.
	'75-'76	'76-'77
Rice, paddy and cereals.....	785	6,212
Seeds and fruit.....	785	7,773
Tea, coffee, spices and sugar.....	1,548	4,575
Liquors and beer.....	1,387	5,281
Metals and manufactures.....	660	931
Wool, ivory, &c.....	3,622	4,772
Cotton, jute, silk and wool.....	695	16,322
Hides and skins.....	819	4,546
Drugs, resin, oil, &c.....	11,148	12,405
Opium.....	21,440	2,672
Try goods.....	2,668	3,124
Other manufactures.....	5,559	1,331
Sundries.....	38,887	58,092
Coin and bullion.....	5,301	4,930
Total.....	44,188	65,044

In 1877-1878 the import of merchandise declined to £35,367,000, while the import of coin and bullion increased to £11,436,000; the export of goods, on the other hand, rose to £64,904,000. Sixty per cent. of the entire trade is absorbed by the home country; China represents 14 per cent. The import of India from the United Kingdom consists, to the extent of 84 per cent., of cotton, woolen and metal goods, and coal.

The maritime movement has been as follows:

Flag.	Vessels.	Tonnage.	Flag.	Vessels.	Tonnage.
British.....	1,635	1,788,346	British.....	1,798	1,937,521
Anglo-Indian.....	2,103	283,085	Anglo-Indian.....	1,862	251,069
Foreign.....	817	451,495	Foreign.....	888	501,999
Native.....	1,664	106,997	Native.....	1,633	108,474
Total.....	6,219	2,629,923	Total.....	6,201	2,799,063

Of railroads, there were built last year 718 miles, increasing the total length now operated to 7552 miles, and the total outlay for the same to £113,344,500. During the previous year there were 6834 miles being operated; 6003 were private lines and 831 government lines. The gross receipts in 1876 were £8,744,317, and the expenses £4,227,162.

Prolonged droughts and famines are of frequent occurrence in India. In 1877 there was dearth in the South and an unusual abundance of breadstuffs in the North; all that had to be done, therefore, was to forward the grain by rail southward. In that year the enormous aggregate of 2,883,000 tons of grain was conveyed by the railroads to the famine-stricken districts. What would have become of the starving millions without this assistance the late famine in China has shown, where 40,000,000 people perished for the lack of food.

An equally important feature is the productiveness of India in various ways not dreamed of twenty years ago. We mean its growing importance as a wheat and tea-producing country. Of wheat, India exported to England in 1871, 78,000 cwt.; in 1875-76, 2,498,185 cwt.; in 1876-77, 5,583,336 cwt.; and in 1877-78, 6,340,150 cwt. The export of India-grown tea to England rose from 9,000,000 lbs. in 1868 to 24,361,599 lbs. in 1876-77, and to 33,459,075 lbs. in 1877-78. Even in cotton spinning and manufacture India is making rapid strides. Thus she exported to foreign countries 7,926,710 lbs. of twist in 1876-77, and the ensuing year 15,600,291 lbs. Of cotton goods during the same period the export rose from 15,544,163 yards to 17,546,369. There are in India 48 cotton mills, 25 of which spin and weave and 16 weave only. The best operatives earn from £3 to £8 per month; the women and children, 14 to £1 per month. There are 15 jute mills, producing £188,859 worth of gunny bags, &c., in 1872, and £719,478 in 1877. During the two years 1876 and 1877 they turned out 71,000,000 gunny bags. The silk industry, on the other hand, is declining. The same relates to the production and export of raw silk. In former years (1867-70) the export annually ranged between 2,145,000 and 2,574,000 lbs. In 1876 it had fallen to 1,704,000 lbs.

The area planted with cotton is also diminishing of late years, and has decreased from 4,516,000 acres to 3,232,000. Indigo, on the contrary, is rising. In 1877 there were produced 137,000 maunds (one maund weighs about 80 lbs. English), against 102,000 in 1876 and 127,000 in 1875. An average crop may be set down at 100,000

maunds, worth, at present prices, about £2,500,000. Coffee cultivation about holds its own. Tobacco has a fair prospect before it; quinine bark a brilliant one.

The postal service of India is being perfected as rapidly as the marvelous growth of trade demands. The ensuing figures will suffice to show this:

Years.	Post-offices.	Millions of letters.	Millions of newspapers.	Receipts.	Expenses.
1872-73.....	3,006	83	8	\$277,047	\$704,193
1873-74.....	3,178	99	9	676,645	725,357
1874-75.....	3,403	104	9	719,587	739,191
1875-76.....	3,661	108	9	752,094	745,445

This service, therefore, became a paying one dating from 1874-75. The telegraph is keeping pace with the post office. On March 31, 1875, the length of lines in operation already extended over 16,649 miles, the length of wire being 33,798 miles and the number of offices 225, forwarding 958,408 dispatches, which the following year increased to 1,166,833. The receipts in 1875-76 were £212,914, and the expenses £387,581.

Our trade with British India during the past three fiscal years has ranged as follows:

	Imports.	Exports.	Foreign.	Total.
1875.....	\$12,800,937	\$356,564	\$7571	\$13,174,072
1876.....	10,725,012	862,620	3020	11,591,259
1877.....	16,650,110	2,395,710	1843	19,047,663

Some of the principal goods we have exported thither during the last fiscal may be enumerated:

Indian corn.....	\$13,050
Cotton goods.....	78,841
Drugs.....	10,820
Rosin.....	18,571
Petroleum.....	534,137
Spirits of turpentine.....	48,269
Manufactured tobacco.....	20,131

The more valuable goods which we draw from India, such as indigo, are largely received through the Suez Canal via London, but the bulky goods, such as jute, gunny cloth and gunny bags, hides, goat skins, linseed, saltpeter, &c., have to be imported by sailing vessels. The freight by steamers would fall too heavily on these goods. The greater portion of the trade between the United States and India was in former years done from Boston, but gradually New York has absorbed this business. The old Boston concerns, grown rich in this trade, have been wound up, and as competition had rendered this business less desirable, but few new houses have been established in their place. It has been different in this city, where the trade for the past twenty years has, to a considerable extent, been transacted by Greek firms accustomed to do a large trade on slender profits, and from being a business almost exclusively carried on by American firms, it has since assumed a more cosmopolitan character.

Our commerce with India would be greater if that country did not chance to produce, on an extensive scale, some of the very staples which form a considerable portion of our own export—we mean cotton, wheat, &c. We are their competitors in these products in the European markets; but as we have shown, India has such a variety of goods for export that we are never at a loss for a home freight, and this being the case, India will continue to take petroleum and manufactures from us in increasing quantities, and that market will become more important for us in the future.

#### An Open Field for Iron Works.

The *Denver Tribune* makes the following statement on the iron and coal resources of Colorado, and points out the circumstances favorable to a local iron industry:

"The importation of machinery into Colorado amounts yearly to one and a half to two millions of dollars, and adding to this rails, railroad iron, pig and merchant iron, stores and other hardware, the importation of this material will not be less than \$4,000,000. And the demand in this respect is on the increase, and may be doubled or tripled in a few years, for the reason that not only the mines of Colorado are becoming daily more productive and numerous, but also those of the adjacent mining regions. What is now imported from Chicago, St. Louis, Pittsburgh, Baltimore and other Eastern cities could be more cheaply drawn from Denver, as freight for 1000 or 2000 miles of transportation excludes all possibility of competition, if Denver will make use of its advantages of geographical position and natural resources immediately within its reach. In the neighborhood of this city are immense deposits of iron and coal. We find layers of iron near Boulder, Ralston Creek, Morrison, Platte Cañon, Hall's Gulch, South and Middle Park, all, except the latter, easily accessible by railroads. The ore is partly magnetic, and contains, on an average, about 55 per cent. of iron. Experiments made with ore from different places are highly satisfactory. Coal also is in abundance and cheap. Coal for steam purposes is found but a few miles distant from Denver, and for smelting it can be obtained from various places. Trinidad, in Southern Colorado, furnishes us now with coke, but our main reliance will be on the large deposit of anthracite and common bituminous coal on the western slope of the Rocky Mountains, where a belt of this kind of coal has been discovered on the bank of the Gunnison River, and also north from there as far as White River. The South Park Railroad and the extension of the Colorado Central Railroad from Georgetown are aiming in this direction, and we hope in a year or two to see the products of the coal fields of the western slope of the Rocky Mountains in our market.

"In Denver are four machine shops and a rolling mill. They are doing well; but we want above all a blast furnace and puddling furnace to make our own iron, before we can expect to give to these and other indus-

tries of a similar kind that impetus which will enable them to do justice to the wants of the country. We pay now \$30 for pig iron, and it is estimated by competent experts that we can produce the same article here for \$19, making full allowance for higher wages and other monetary inconveniences. We need men of experience, energy and capital to start in. Such will find here the richest harvest for their enterprise, and would soon become millionaires. Why does not Pennsylvania, for instance, move her idle furnaces to Colorado, and bring her superfluous labor along, and thus bless both countries?"

#### The American Institute of Mining Engineers.

##### Proceedings and Excursions of the Pittsburgh Meeting.

Pittsburgh, May 17, 1879.

To-day concludes the most memorable meeting of the American Institute of Mining Engineers—most memorable because of the large attendance, the varied interest of the proceedings, and the abounding hospitality with which the members have been entertained. In our issue of last week we gave a full account of the proceedings at the day and evening session of Tuesday, the 13th inst. At that point we resume our report:

Wednesday was given up to the enjoyments of a sail on the rivers including this busy city, and a visit to a number of interesting manufacturing establishments conveniently reached by boat. At the unaccountably early hour of 8.30 in the morning, the members, their ladies and the guests of the local committee assembled at the Monongahela Wharf (so-called because there is no wharf there, but only a bank with a sort of covered pontoon moored to the bottom) and crowded the decks of the steamer *Chartiers Valley*. Mr. Shinn, who acted as marshal with an efficiency which is certainly "gratifying to his credit," had given notice that with Pittsburghers 8.30 meant 8.30, and not 8.35, and that if the boat had steam up she would leave at the appointed hour, whether anybody was there or not. Consequently, everybody was prompt, and the long line of colored men who filed on last, carrying sundry mysterious packages, suggested the idea that those who neglected to provide themselves with crackers and cheese and cold tea, would not hunger and thirst in consequence. The first point of interest was the alleged dam across the Ohio at Davis Island. It is called the Davis Island dam, but when one comes to look for it he is forcibly reminded of Ross Brown's description of his quest for a certain mill by a certain dam, which was in effect that he "found a dam by a mill site, but he didn't find the mill by a dam site." In a word, there is to be a dam at Davis Island, but about all there is of it at present is a house on the bank and some unfinished stonework forming part of the lock. It appeared on this part of the sail that the present is one of the times when, as Mr. Metcalf put it, "the river bottom is very high." It was suspected by some that the pilot struck the several bars to show how important it was that the improvements at this point should be completed, for he managed to get on just where he could conveniently get off again, without unnecessary delay.

Here we may say that the *Chartiers Valley* is a very uncommon steamer. The area of her deck is 100 x 95 feet, more or less, and she has no visible means of propulsion. Upon inquiry we heard that she was modeled after a wash tub "forard" and a catamaran aft, and that her single paddle wheel was exactly amidships. But she is a first-rate excursion boat, notwithstanding her peculiarities.

At the Davis Island improvements only a brief stop was made. Lieut. Mahn, in charge, showed the visitors every attention, but they could not stay long enough to see much, and it must be confessed there was not much to see.

Leaving the dam, the party returned up stream until the Superior Iron Mill, operated by A. Kloman & Sons, was reached. There the party witnessed the rolling of eye bars on Kloman's new universal mill, which was fully illustrated and described in *The Iron Age* of April 24, 1879.

From Kloman's mill there was a "go-as-you-please" walking match to the car-wheel foundry and machine shop of John L. Gill, Jr., a little above. Mr. Gill's testing machine, illustrated on another page, was the special object of interest here. The boat followed the excursionists to this point, and after inspecting the machine referred to, all came aboard again.

The next stopping place was the outside edge of a flotilla of coal barges, across which it was necessary to pass to reach the works of Messrs. Lewis, Oliver & Phillips. The programme included a stop first at Dilworth, Porter & Co.'s mill, further down, but a landing could not be effected there and, as a consequence, the excursionists were compelled to walk through the scorching noonday sun to the latter mill. Here, in an atmosphere compared to which that outside was delightfully cool and refreshing, the method of making railroad spikes by machinery was thoroughly investigated. Lewis, Oliver & Phillips' mill was then visited, and a look taken at the bar iron rolling.

Returning to the boat, a welcome lunch was discussed while passing through the lock to get above dam No. 1. Chess, Smythe & Co.'s works were then visited, the mak-

ing of tacks being the special feature of interest.

Crossing to the north side again, the party went through the copper-rolling works of C. G. Hussey & Co., near the new gas works. Although the heat was intense in some parts of the works, the ladies as well as the gentlemen stood it bravely, and saw everything that was to be seen.

The American Iron Works of Messrs. Jones & Laughlin received the next visit, where hot bar rolling, cold shaft rolling, &c., were eagerly inspected. Although quite a long stay was made at these works, it could scarcely be said that everything was seen, the mill and adjuncts being so extensive.

The last manufacturing establishment visited was that of Anderson & Co., which is noted principally for rolling steel wire used in making wire cables. After inspecting these works the little boat steamed up to Glenwood and returned to the Monongahela Wharf, reaching there about 6 o'clock. Despite the very warm weather the excursion was a delightful one, and gave a good idea of a portion of Pittsburgh's industry.

#### Wednesday's Evening Session.

The evening session was largely attended, it being understood that the discussion of Dr. Dudley's papers on steel rails would be resumed, and that a lively debate of great scientific interest might be expected.

The proceedings were opened with a paper by Mr. Wm. Metcalf, describing some blackboard illustrations of the Swindell gas furnace, now in successful operation at the Crescent Steel Works. We postpone a description of this furnace until a more convenient opportunity shall offer.

Dr. Raymond followed with some remarks on the operations of the Salisbury apparatus for burning coal tar, in operation at Trenton.

The discussion on Dr. Dudley's formula for steel rails was begun by a paper by Mr. Cloud. Capt. William R. Jones, of the Edgar Thomson Steel Works, also read a paper, in which much solid scientific fact was so blended with playful humor, that the Institute gave itself up to the most uproarious mirth. Having been at some trouble to secure a stenographic report of this discussion, which will be given in these columns as soon as it is ready for publication, we will not give it further space in this correspondence.

Mr. Geo. W. Maynard, the representative in this country of Messrs. Thomas and Gilchrist, had intended to present to the Institute the paper read by Mr. Thomas before the recent London meeting of the British Iron and Steel Institute, but owing to its failure to come to hand as expected, he was forced to substitute, unprepared, a summary of the data thus far published. Since then both the communication of Messrs. Thomas and Gilchrist, and that of Mr. Snelus (which was spoken of by Dr. Raymond at the meeting) have arrived, and as our readers will find on another page careful abstracts of these papers, giving the latest information, we omit further reference to the remarks made by Messrs. Maynard and Raymond.

#### Thursday's Entertainments.

All of Thursday was given up to the excursion of the day and the reception in the evening. The excursion was over the Allegheny Valley Railroad, a special train leaving the Union depot about 9 o'clock, with something over 100 members of the Institute aboard. The first stop made was at Wilson, Walker & Co.'s mill, and the next at the Union Iron Mills. At Forty-third street a stop was made long enough to allow the excursionists to cross the bridge to Allegheny and examine the iron mill of Graff, Bennett & Co., where natural gas, brought 20 miles from Butler County through a pipe line, is used for fuel. The steel works of Miller, Metcalf & Parkin, the Keystone Bridge Works and the Lucy Furnace were next visited.

Before resuming the trip a lunch, set out in the forward car, was partaken of. The next place visited was the Standard Oil Refining and Barrel Works. This is the second largest establishment of the kind in the world, the product being 4000 oil barrels per day.

The Brilliant Oil Refinery and the new water works at Negley's Run were then inspected. The pumping works excited more interest in the visitors than anything before seen in this city, or anything they are likely to see. The general opinion seemed to be that the pumping engines were the most extraordinary pieces of machinery to be found anywhere. A few unguarded remarks of this character led the local reporters who hovered around to hear what was said, to form very erroneous conclusions as to what the opinion of the visiting engineers really was. As these comments were evidently not intended for the public ear, we refrain from repeating them.

Leaving the water works, the Allegheny Valley Railroad shops were inspected; also, the tool works of Metcalf, Paul & Co., and, on the return trip, the steel works of Hussey, Howe & Co.

#### THE RECEPTION

In the evening at the house of Mr. William P. Shinn, in one of the delightful east end suburbs of the city, was a brilliant success in all respects. The attendance included all the visiting members, all the ladies of the party, and a large representation of the local membership and the ladies of Pittsburgh.

[Continued on page 20.]











## IMPORTS

Of Hardware, Iron, Steel and Metals into  
the Port of New York, for the Week ending  
May 20, 1879:

Hardware.	Tools, chest, 1	Per. caps., ca., 1
American Meter Co., Mide., pgs., 1	Chaplin E. C. Cases, 207	
Ansonia Clock Co., Mide., pgs., 1	Drexel, Morgan & Co. Tons, 80	
Arnson & Witznack, Mide., pgs., 1	Franklin Chas. G. Sheet iron, bds., 360	
Baldwin Bros. & Co. Gun barrel fittings, ca., 5	Henderson Bros. Pig, tons, 500	
Blumenthal A. & S. Mide., pgs., 1	Lambert Gustaf. Nail rods, bds., 296	
Boker Hermann & Co. Hdw., cutlery, guns and per. caps., pgs. 150	Martí Carlos. Iron rods, bds., 12	
Collins & Co., Hdw., ca., 5	Marcel Wm. D. Ore, tons, 800	
Eichhorn A., Hdw., ca., 1	McCoy & Co. Hoop iron, bds., 4200	
Erie Railway Co., Mide., pgs., 1	Milliken & Smith. Wire rods, bds., 408	
Folsom H. & D. Arms, ca., 1	Williamson James & Co. Pig, tons, 100	
Franklin Chas. G. Bolts and nuts, ca., 25		
Friedman & Lauterjung, Mide., pgs., 3	Order.	
Fuller Bros. Mide., ca., 1	Bars, 455	
Graef, Nevins & Co., Mide., pgs., 3	Bundles, 50	
Hayden Peter, Mide., pgs., 3	Iron sleepers, 20	
Hecht Bros. Mide., pgs., 4	Ore, tons, 500	
Hermann H. & Co., Mide., pgs., 28	Pig, tons, 700	
Hopkins E. T., Mide., pgs., 108	Sheet iron, bds., 361	
Howard, Sanger & Co., Mide., pgs., 3	Spiegel, kilos, 203,000	
Lewis Bros. & Co., Mide., pgs., 1		
Love & Roberts, Firearms, ca., 2	Brown W. Bundles, 133	
Mason John H., Wire rope coils, 8	Gaulier Steel Co. Mide., pgs., 3	
McCoy & Co., Hdw., ca., 2	Wessell Aug. Bundles, 134	
Mide., pgs., 13	Wolf H. H. & Co., Steel wire, pgs., 1112	
Moore's J. P. Sons, Arms, ca., 5	Woodford W. O. Bars, 37	
Prosser Thos. & Son, Mide., pgs., 47	Cases, 7	
Rogers H., Mide., pgs., 1	Order.	
Schovverling, Daly, & Gales, Mide., pgs., 4	Bars, 20	
Somon, Goest & Co., Type, kegs, 4	Bundles, 85	
Struller, Leis & Co., Per. caps., ca., 4	Cases, 9	
Von Cleft & Co., Mide., pgs., 6	Old spring steel, tons, 75	
Ward Asline, Mide., pgs., 1	Scrap, tons, 100	
Wetzlar M., Mide., pgs., 3		
Wiesbusch & Hilger, Hdw. and cutlery, pgs., 57	Aleo Miguel, Tins, ca., 8	
Winchester Arms Co., Mide., pgs., 1	Baring Bros. Tin, slabs, 7385	
Wolf J., Type, ca., 5	Brown Bros. & Co., Tin, ingot, 1	
Woodford W. O., Grindstones, 42	Bruce & Cook, Tin plates, bds., 390	
Order.	Douglas Jas. & Co., Old metals, pgs., 3	
Antimony, ca., 50	Drexel, Morgan & Co., Tin plates, bds., 317	
Canal coal, a quantity.	Franklin Chas. G. Tin plates, bds., 1077	
Files ca., 17	Hopkins & Bevan, Tin plates, bds., 200	
Guns, ca., 4	Mayer Bros. & Co., Tin, slabs, 1000	
Hdw., bds., 480	Meyer M., Lead, bars, 5564	
Regulus of anti- mony, ca., 34	Naylor & Co., Tin plates, bds., 2013	
	Phelps Dodge & Co., Tin plates, bds., 10,751	
	Thackray & Co., Old metal, pgs., 3	
	Order.	
	Tin, ingots, 634	
	Tin, slabs, 12,936	
	Tin andterne plates, bds., 6579	

## COAL

The Coal trade during the past week has been marked by no especial feature either in prices or movement. Most dealers here have as many orders upon their books as they care to fill for the present month and at the present prices, and are not generally offering Coal. They are, as a rule, we think, declining to duplicate orders already taken. The active demand of the previous week has not apparently been maintained, and, if the order books were not already well filled, it would be regarded as a rather dull trade. While printed quotations are the same as last week, dealers are reporting that the actual prices are somewhat nearer the quotation than heretofore. It is said that store Coal is as much as 10 cents nearer the quotations than last week. This may, however, be taken as the asking price, rather than the actual figure at which sales are made. Those who are out of the market, either from lack of Coal or from surplus of orders, are apparently making an advance in their asking prices, which is probably more apparent than real. The manufacturers and consumers generally appear to be putting in all the Coal that they can find room for, or, where room is unlimited, all that they can pay for. They do not, however, seem inclined to buy when an advance is suggested, although willing to order freely at the present figures. Freight has not advanced since our last. We quote \$1.40 @ \$1.45 to Boston, and with the usual advance for the ports further East. Providence is still quoted at \$1. To New Haven, in large cargoes, we hear of 60¢ being paid, though the rate in small vessels we think is higher. The scarcity of vessels still continues, and it will probably be a considerable time before any change can take place in this respect. The Coal tonnage for the year does not, according to Mr. Seward's tables, grow perceptibly over that of last year. The accidents at the mines and the want of miners are two of the most apparent causes. The operators in some of the regions complain of the great scarcity of men, which they say is caused by an exodus that has been going on from the regions for some time, and which threatens to become a serious factor in the Coal production problem.

The printed prices issued this week are the same as those given last week. Auction prices:

Steamer.....	\$2.05	Stove.....	\$2.30
Grate.....	2.05	Chestnut.....	2.25
Egg.....	2.05		
Lohigh prices in general are about as follows:			
Lump.....	\$3.30	Stove.....	\$2.75
Broken.....	2.75	Chestnut.....	2.50
Egg.....	2.75		

The Delaware and Hudson quote \$2.20 for Lump, Steamer and Grate; Egg, \$2.25; Stove, \$2.55, and Chestnut, \$2.50. The Pennsylvania Coal Company's new circular quotes for Coal at Newburgh: \$2.15 for Lump, Steamer and Grate, \$2.20 for Egg and \$2.35 for Stove and Chestnut. There is

50 cents per ton additional for delivery in New York on this coal.

## OLD METALS, PAPER STOCK, &amp;c.

In the Old Metal market this week we note a free demand for Copper and Brass Composition at the old rates. Zinc has a downward tendency, and will probably continue to decline. The Rag and Paper Stock market is dull in all its branches.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy.....	per lb., \$0.11	
Copper Bottoms.....	" "	
Yellow Metal.....	" "	
Brass, heavy.....	" "	
Brass, light.....	" "	
Composition, heavy.....	" "	
Lead, solid.....	" "	
Lead, sheet.....	" "	
Zinc.....	" "	
Pewter, No. 1.....	" "	
Pewter, No. 2.....	" "	
Wrought Iron.....	prtm. \$16.00	17.00
Light do.....	" "	
Stove Plate.....	" "	
Machinery do.....	" "	
Grate Bars.....	" "	

The prices current for Rags, &c., are as follows:

Canvas, Linen.....	per lb., 3 c.	3 1/2 c.
White Cotton, No. 1.....	" "	1 1/2 c.
White, No. 2.....	" "	1 1/2 c.
No. 3.....	" "	1 1/2 c.
Mixed, Woolen.....	" "	2 c.
Soft, do.....	" "	2 1/2 c.
Mixed Rags.....	" "	2 c.
Gunny bagging.....	" "	2 c.
Book Stock.....	" "	2 c.
Newspapers.....	" "	2 c.
Waste Paper and Scrap.....	" "	2 c.
Kentucky Bale Rope.....	" "	2 c.
Tarred Shaking.....	" "	2 c.
Grass Rope.....	" "	2 c.

Messrs. Du Plaine & Co., Philadelphia, under date of May 20, quote the market prices for Old Metals as follows:

Heavy Old Copper.....	1 1/2 c.	
Light Tinned Copper.....	1 1/2 c.	
Copper Bottoms.....	1 1/2 c.	
Locomotive Copper and Tin Bronze.....	1 1/2 c.	
Heavy Red Brass Scrap.....	10 1/2 c.	
Light Red Brass Scrap.....	9 c.	
Heavy Yellow Brass Scrap.....	9 c.	
Light Yellow Brass Scrap.....	7 c.	
Old Lead Pipe.....	3 c.	
Old Junk Lead (melted in mass).....	2 1/2 c.	
Tea Lead.....	2 1/2 c.	
New Zinc Clippings.....	3 1/2 c.	
Old Scrap Zinc.....	3 c.	
Old Battery Zinc.....	2 1/2 c.	
Plumbers' Lead Joints.....	3 1/2 c.	
No. 1 Pewter.....	11 c.	
No. 2 Pewter.....	8 c.	
Old Type Metal.....	4 c.	
Red Brass Turnings.....	7 c.	
Yellow Brass Turnings.....	6 c.	
Spelter Dross.....	1 1/2 c.	
Lead Dross.....	1 1/2 c.	
Stereotype or Electrotypes Plates.....	4 c.	

## PHILADELPHIA.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, May 20, 1879.

**Pig Iron.**—The market is quiet, but firm, and the tendency is still toward higher prices. Sales have not been particularly heavy, as no one seems willing to accept orders for future delivery unless at higher prices, so that business is of a "hand-to-mouth" character. The consumption of Iron seems to be increasing, and the future of the trade is of a hopeful character. We advance our quotations somewhat, say, No. 1 Foundry, \$18.50 @ \$20; No. 2 do., \$17.50 @ \$18; Gray Forge, \$16.50 @ \$17. Sales of No. 1 Foundry, in round lots, reported at \$19.50 for summer delivery.

**Muck Bar.**—The market is quiet, but firm, with prospects of higher prices at an early date. Sales, Philadelphia delivery, \$32, with \$31.50 @ \$32.50 as extreme figures.

**Blooms.**—The market is quiet at unchanged prices, as follows: Sunken Scrap Blooms (246 lb), \$38 @ \$39; Northern Ore Blooms (2240 lb), \$33 @ \$37; best quality Charcoal Billets (2240 lb), for wire and steel purposes, \$58 @ \$60; Bars do., \$62.50 @ \$65; Sheet Iron Blooms, cornered (246 lb), \$53 @ \$55; Cold-blast Charcoal Plate Blooms, \$50 @ \$53; run-out Anthracite, \$45 @ \$47.50.

**Structural Iron.**—The market is very active, and some large contracts have just been closed including one of 1000 tons Beams, Angles, &c., for the Erie Railway Co.; another of 600 tons of a similar character, besides numerous small lots. Prices are very firm, but as yet unchanged, although the tendency is toward an advance. We quote: Angles, 2.1¢ @ 2.3¢; Tees, 2.3¢ @ 2.4¢; Beams and Channels, 2.5¢ @ 2.7¢, according to specification.

**Plate and Tank Iron.**—The market is quiet, and no orders of special importance have been entered since last report. Prices are said to be somewhat firmer, but the market is irregular and nominally as before quoted. Skelp is in demand; orders amounting to over 1000 tons are in the market, and will probably be closed in a day or two. We quote: Skelp, 1.0¢ @ 2¢; Common Plates, 2.2¢ @ 2.3¢; Tank Iron, 2.4¢ @ 2.4¢; C. No. 1, 2.4¢ @ 2.6¢; Shell Iron, 2.7¢ @ 2.9¢; Flange Iron, 3.7¢ @ 4¢; Solid Firebox, 4.85¢ @ 5¢, and Best Bloom, 5.5¢ @ 6¢.

**Sheet Iron.**—The market is quiet, but with more disposition to buy than during the past month or two. Prices are steady, and for small lots may be quoted as follows: Common Sheet, No. 20 to 23, 3.2¢ @ 3.3¢; No. 24 to 28, 3.4¢ @ 3.5¢; Best Refined Sheet, No. 25 to 28, 3.6¢ @ 3.7¢; No. 16 to 24, 3.4¢ @ 3.5¢; Best Bloom Sheets, No. 16 to 24, 5.5¢ @ 5.7¢; No. 25 to 28, 5.8¢ @ 6¢; Refined Plates or Blue Annealed, 5.16 to 16, 2.6¢ @ 2.7¢; Best Bloom, 5.16 to 16, 5.3¢ @ 5.5¢; A Patent Planished, 10.1¢ @ 10.5¢; B Patent Planished, 9.1¢ @ 9.5¢; Best Bloom Galvanized, 45 ¢ discount; second quality, 55 ¢; extra discounts for large lots.

**Bar Iron.**—The market is very firm, and a larger volume of business has been done during the past week than for some time past. Sales in large lots have been made during the week at an advance of nearly \$2 per ton, one order for 1000 tons at full prices having been taken a day or two ago. We quote 1.5¢ for Common to 2¢ for Best Refined.

**Steel Rails.**—There is the usual amount of urgent inquiries, but the mills are so full of orders already that they cannot accept anything additional, unless for delivery in the distant future. Some few orders

for small lots have been taken at \$42 @ \$43 at mill, which may be considered an average rate either for immediate or future delivery. Sales appear to be purely a matter of accommodation, buyers are willing to pay the price, and manufacturers show no disposition to take advantage of buyers' necessities, and decline orders only because it is impossible to fill them. We quote the market steady at \$42 @ \$44 at mills.

**Iron Rails.**—Continue in active demand, with sales of large lots at full quotations. Several orders have been placed during the week, including one of 7000 tons for the Gulf, Colorado and Santa Fe Railway. Numerous inquiries are reported from the South and Southwest, and sales, to a large extent, have been for delivery in this direction. The mills are very full of work, and there is every reason to think that the demand will continue for some time, as there are more bona fide buyers in the market than we have seen before. Some are well prepared with cash, although a large number are endeavoring to buy on long time, with bonds as collateral. The abundance of money and general renewal of confidence in railway securities, however, will doubtless enable many to raise funds, and thus after a thorough other sources, and thus after a while be in a position to enter the market as cash buyers. We quote \$35.50 @ \$37, according to location of mill, section of rail, &c. Sales of 3000 tons 56s reported at \$37.50 at tide.

**Spikes.**—The demand is urgent at former prices, viz.: 5 1/2 x 9-16, 2 1/4¢; 1/4 x 4 and longer, 2 1/2¢; 7-16 x 4 and longer, 2.6¢; 3/4 x 3 1/2 and longer, 3¢.

**Old Rails.**—The scarcity still continues, and sales of small lots for immediate delivery have been made at advanced rates. At the moment the dearth of Old Rails on the spot is as great as ever, with no immediate prospect of relief. The demand seems to be from all quarters, and sales in most cases appear to have been made before the Rails were taken up, so that comparatively few have been shipped to the leading markets, as was formerly the case, "for sale to arrive," at current rates. We regard this as conclusive evidence of the great improvement in the iron trade. Iron of all descriptions has had to search for buyers until recently, but now buyers generally appear to be in search of iron. We quote \$22 @ 22.50 as the nominal market rate.

**Old Rail Wheels.**—Sales of small lots have been made at about \$18, Philadelphia delivery—\$19 at an outside point—and large lots offered at \$18.50, Philadelphia delivery. Buyers appear unwilling to pay over \$18.

**Scrap Iron.**—The demand is active, and sales are easily made at somewhat higher figures, say \$23.50 @ \$24.50 for Wrought and \$14 @ \$15.50 for Cast.

**Nails.**—Are quiet, but prices are firm at \$2.25 for wholesale lots.

## PITTSBURGH.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, PA., May 20, 1879.

Pittsburgh is realizing more and more the advantage of railroad competition, as she has cheaper rail freights now than ever before, and her manufacturers, in this important respect, have no reason to complain. The Pittsburgh and Lake Railroad has reduced rates on heavy freight to 12 1/2¢ per 100 lbs., both to Chicago and New York, and the probability is that the Pennsylvania Company will do likewise; but everything else being equal, our business men are giving the former company the preference. Owing to alleged discriminations on the part of the Pennsylvania Company, a bad feeling has existed here for several years against this corporation; hence it is not strange that our people are inclined to give all the business they possibly can to the P. & L. In these days of small margins at best, the matter of transportation is one of vital importance.

In regard to the labor question nothing has been developed, and it looks as if nothing would be done until the present arrangement expires on June 1. It is intimated that puddlers are willing to make a concession of 50¢ per ton for puddling, and we presume, if so, that the rollers and heaters would also make a corresponding reduction; but mill-owners, it is said, will not be satisfied with a reduction of less than \$1 per ton, and even then, it is claimed, they would be paying considerably more than is being paid for the same work in the East. However, all is surmise in regard to the result of the pending issue, but it is about as certain as anything can be that, unless a reduction is made by the skilled laborers, there will be a general lockout, not only here in Pittsburgh, but throughout the West.

**Pig Iron.**—The general position of the market remains much the same as noted in our last report; business continues quiet, and we cannot reasonably look for any improvement until the labor question is disposed of. The mills, in view of a lockout next month, are buying very sparingly, as they are anxious to close the month with as little stock as possible. Bituminous Irons may be quoted at \$20 @ \$21, 4 mos., for Foundry, and \$17.50 @ \$20 for Mill, the outside figure being demanded for standard brands of all-ore Red-short. Bessemer continues very quiet; there have been no sales made in this market for some time past, but in the Shenango and Mahoning valleys, \$20 and \$20.50, cash, is the price quoted deliverable at furnace. Anthracite Irons are firm, as producers say they can do better in the East than at prices current here; hence the offerings from that point are comparatively light. Coke Irons are firm, but unchanged, selling at \$16, cash, to \$16.50, 4 mos., for Mill.

**Manufactured Iron.**—There has been nothing particularly new developed during the past week. Business continues in an unsettled and unsatisfactory condition, owing to the uncertainty attending the labor question. Manufacturers, as a rule, are not disposed to make any large contracts, particularly for future delivery; and prices, while no higher, are firmer than they were a few months ago. A mooted question is whether the heaters and rollers, in case of a suspension of the puddling furnaces, will refuse to work up Muck Bar accumulated by

some of the mills. The general opinion is that they cannot well get out of it, in view of the fact that the puddlers were paid the regular rates for puddling the Muck Bar in question; but what the rules of the Amalgamated Iron Association are in regard to the matter, we do not know. We continue to quote prices on a basis of 1.70¢ @ 1.75¢, 60 days.

**Nails.**—While there has been no general advance, Nails cannot be purchased at the bottom rates of a month ago. Manufacturers here are doing next to nothing, refusing to sell except in small lots to regular customers, and then at very low prices, and from what we can learn, this same feeling prevails at Wheeling and elsewhere in the West. Nails have been selling at a loss in the West all the year, and without any good reason therefor. We now quote at \$2, 60 days, 2 per cent. off for cash, for small lots to regular customers.

**Horse and Mule Shoes.**—Are still quoted in 100-kg lots at 3 1/4¢ and 4 1/4¢, cash, with special rates for larger lots.

**Railroad Spikes.**—Unchanged at 2 1/4¢, 30 days.

**Wrought-Iron Pipe.**—There is an increasing volume of business. Some of our mills are working up to their full capacity and unable to keep up with their orders, but prices are no better, and herein is the great source of complaint. Discount on Gas, Water and Steam Pipe, 65 @ 70; Boiler Tubes, 50; Oil Well Casing, 65 @ 72 1/2; do. Tubing, 18 @ 20¢ cent. At these rates it is claimed, there is no margin for profit to manufacturers.

**Rails.**—The Edgar Thomson Co. have made no recent sales, not because there was an absence of inquiry, but in consequence of the fact that they have orders sufficient to absorb their entire production until October. Old Iron Rails are in light supply for immediate delivery, and may be quoted steady at \$22 @ \$22.50, with considerable inquiry. Old Steel Rails, in the absence of sales, are quotable at \$25 @ \$26.

**Steel.**—There is nothing new to record in regard to this important interest; business continues active and mills have all they can do, and while prices remain unchanged, the tone of the market is firmer. The Steel interest of this country never was in a more prosperous condition than at the present time, and its growth within the past few years has been wonderful. Notwithstanding the largely increased capacity, there is a demand for the entire production.

**Scrap.**—The market presents no new or important features that we are aware of; business continues rather quiet, while prices have undergone no recent change. No. 1 Wrought Scrap, \$22 @ \$22.50, net; Wrought Turnings, \$14 @ \$15; Car Springs, \$30 @ \$31; Car Axles, \$27 @ \$29; Old Car Wheels, \$19 @ \$20, gross; Cast Boring, \$10.50 @ \$11.

**Window Glass.**—Business continues quite active; manufacturers are generally well supplied with orders, and the outlook is favorable for a good trade all summer. While prices are better than they were early in the year, the margin for the manufacturer is still small, but hopes are entertained of a further improvement in this respect before long. We continue to quote 75 ¢ and 5 ¢ off for car-load lots.

**Coal.**—Owing to the low water in the river there have been no shipments for some time, and the down river markets are firmer and higher in consequence. At Cincinnati there has been quite an advance recently, with a very light stock in first hands, and if navigation continues suspended much longer there will, no doubt, be a still further advance, not only there, but at other points depending upon Pittsburgh for supplies. It is estimated that there are 15,000,000 bushels loaded in boats and barges ready to move as soon as there is sufficient water, and some firms, having all their boats loaded, have been compelled to stop mining.

**Coke.**—There is no abatement in the demand, and notwithstanding the misty outlook of the Pig Iron business, prices continue firm, the recent advance being well sustained. Producers all appear to have plenty of orders. Prices are quoted at \$1.15 @ \$1.25 per ton, deliverable free on cars at ovens.

**Petroleum.**—The only new feature to note is that the bill pending in the Legislature, proposing a tax of 5¢ per barrel, has been defeated, and it is expected the other measure, requiring a tax to be taken out for every new well, will meet with a similar fate. There is a very decided opposition in the producing region to measures of the kind in question.

## CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts., CHATTANOOGA, May 19, 1879.

The first of the week was hot, dry and discouraging to farmers. The last three days have been showery, some heavy rains falling but not lasting long. The whole face of nature has been changed from a brown, parched appearance to one of dark and vigorous green. And the improved prospect of crops has reacted on business, and buyers and sellers are more cheerful. Manufacturers generally have all they can do. No stocks have accumulated. There is no falling off in prices.

**Pig Iron.**—The movement west of Texas has been considerable during the week. South Pittsburgh has blown in stock No. 18 and had excellent luck with it. There has been no halt or hitch at all; she was making 50 tons per day of fine No. 1 Foundry on the 14th. Several car loads of the product have been shipped to Indianapolis. There is a pretty full supply of all grades in the market. Coke Irons—No. 1 Foundry, \$17.50 @ \$18.50; No. 2, \$16 @ \$17; Gray Forge, \$14 @ \$15; White and Mottled \$12 @ \$13. Hot-Blast Charcoal—No. 1 Foundry, extra, \$20 @ \$21; ditto, \$18 @ \$20; No. 2 Foundry, \$16 @ \$18; Gray Forge, \$16 @ \$18; White and Mottled, \$15. Cold Blast Charcoal—Car Wheel Metal, \$22.50 @ \$27.50; do., Extra Standard, \$24 @ \$29.50; Forge, \$17 @ \$22.

**Muck Bar.**—\$27 @ \$34; Old Rails, \$18 @ \$18.50; Old Car Wheels, \$18; Wrought Scrap, \$17 @ \$19.

**Ores.**—Brown Hematite, 50 to 56¢ per ton, \$1.75 @ \$2.25. Red Ferro-silicous, 50 @ 56 ¢; per ton, \$1.20 @ \$1.60. The above prices for ores delivered in Chattanooga on cars, or on the wharf from flat boats.

**Nails.**—Demand good; mills have all they can do, with orders ahead. The outlook for a good business for the summer is fair. We quote at \$2.25 rates, usual discount on job lots.

**Manufactured Iron.**—As usual at this season, the market is dull, but prospects ahead are good. Manufacturers confidently expect a good summer trade. We quote: Bars, 2¢; Railroad Spikes, 2.50¢; Light Rail, 2.25¢; Track Bolts, 3¢; Treble Bolts, 4¢.

**Coke.**—We quote 11¢ @ 15¢ per bushel for washed foundry. Furnace, full supply at \$2 per ton, free on cars at Chattanooga or South Pittsburgh.

**Coal.**—There is no change in the market nor in prices. We quote run of mine, free on cars in Chattanooga, at \$1.25 @ \$1.75 per ton. Lump, as per quality, 10¢ @ 12¢ per bushel.

**Pig Lead.**—4¢; Ingot Copper, 18¢.

**Iron Rails.**—We quote at \$35 per ton.

## BOSTON.

MAY 16.—Pig Iron continues active and firm, and with an upward tendency. The prices from the Boston stores and wharves for small lots are \$21 @ \$23 for No. 1, and \$19.50 @ \$20.50 for No. 2. Manufactured Iron.—Bar continues firm and in fair demand, from the stores at 2¢ per lb. for Refined and 1 1/2¢ for Common. Nails are selling at \$2.25 per keg. Sheet Iron, though in light demand, as usual at this season of the year, is firm at 2 1/4¢ @ 3¢ for single Common and 3¢ @ 3 1/4¢ for double do.; 3 1/2¢ @ 4¢ for Refined; 6 1/2¢ @ 6 1/4¢ for Galvanized, Nos. 14 to 20; 6 1/4¢ @ 8 1/4¢ for do., Nos. 21 to 28; 11 1/2¢ @ 12¢ for Russia perfect, and 1 1/2¢ less for do. No. 1 stained. Plate Iron is in good request at \$2.30 for Tank, \$2.50 for C. No. 1, \$2.75 for Shell, \$3.75 for Flange. These prices are from the mills. Small lots from the stores readily command an advance of 25¢ @ 50¢ above these figures. We quote American Tool Steel at 12 1/2¢ @ 13 1/2¢; English do. at 14 1/2¢ @ 15 1/2¢; American Spring Steel at 5¢ @ 6¢; English do. at 7¢ @ 7 1



Anthracite No. 1.....	19.00 @ 20.00
No. 2.....	18.00 @ 19.00
No. 3.....	17.00 @ 18.00
Mottled and White.....	13.00 @ 14.00
Charcoal, C. B. blooms.....	30.00 @ 35.00
Billets.....	22.00 @ 25.00
Refined Rooms.....	45.00 @ 50.00

## RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows under date of May 19: With two or three exceptions our machine shops and foundries are actively employed. The demand for iron is fair and prices firm.

American Scotch Pig Iron.....	\$21.50 @ 22.50
Anthracite, No. 1.....	19.00 @ 20.00
No. 2.....	18.00 @ 19.00
No. 3.....	17.00 @ 18.00
Mottled.....	14.50 @ 15.50
Coke, No. 1.....	19.00 @ 20.00
No. 2.....	18.00 @ 19.00
No. 3.....	17.00 @ 18.00
Va. Cold-blast Charcoal, Cold-short.....	20.00 @ 22.00
Neutral.....	27.00 @ 28.00
Va. Warm-blast " Cold-short.....	18.00 @ 21.00
Red-short.....	17.00 @ 18.00
Old Balls.....	18.50 @ 19.50
Wrought Scrap No. 1.....	17.50 @ 18.00
" (machinery).....	15.00 @ 16.00
Richmond Refined Bar Iron.....	30.00 @ 35.00
Horse Shoes per keg.....	4.00 @ 5.00
Mule.....	5.00 @ 6.00
Old Dominion Nails, Standard Size, 3/4.....	8.25 @ 9.00
Freights to Philadelphia, \$1.40 per ton of 2440 lbs., by rail.	
Freights to New York, \$1.60 per ton of 2440 lbs. by rail.	

## LOUISVILLE.

W. B. BELKNAP & Co., Iron and Steel merchants, Nos. 113 and 115 West Main street, under date of May 19, write as follows: A very lively movement has characterized our local iron market during the past week, which may be partly due to the low stage of water in the river and consequent slow deliveries from up-river mills. A general disposition is manifesting itself on the part of buyers to order more liberally than heretofore. The tone of the market is unmistakably cheerful and confident. Crops continue to look well in spite of drouth in many places. Growers of both cotton and tobacco are much encouraged by prospect of remunerative prices. Advances from the South in regard to yellow fever have nearly dissipated all apprehensions of any renewal of its ravages the present season. There is no fever at Vera Cruz, and very few sporadic cases at Havana, and the best medical authority predicts an unusually healthy season. We look for a rapid recuperation of material prosperity at the South, and a better trade than usual during the hot months.

## Our English Letter.

## Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., May 5, 1879.

## THE POET'S MONTH

finds us hopeful, but not so advanced in a material sense as one could wish since the advent of this year. We are certainly not in a worse position than we were at that time; indeed, in several respects we are better off, but the situation as a whole is not pregnant with that amount of business which we had hoped would have come upon us during the spring quarter. On the other hand, we have not retrograded, so that we have at least that negative comfort. There are gleams of hopeful sunshine around us and in the distant horizon in various directions, but—again that but—the warm rays of tentative prosperity are chilled and held in check by the cold east wind of doubt and poverty—just as the actual sunshine of the time being is nipped by the bitter blasts of the northeaster, which is icy enough to pierce one to the very marrow. Taking yet another view, we fancy we can perceive materials for hoping and believing that we are on the borders of that happy land in which active occupation goes hand-in-hand with remunerative profits. I had the pleasure and satisfaction of hearing some very hopeful and encouraging expressions the other day from the lips of Mr. W. H. Brittain, Master Cutler of Sheffield, who spoke at a *déjeuner*, held in connection with the opening of the exhibition of cutlery here. Mr. Brittain said he could see a silver lining to the terribly black cloud of depression, under the shadow of which we have so long been. Already an improvement was clearly evident in the far West—whence the first signs of a change for the better were generally apparent—and especially in America. Firms at Sheffield were daily receiving telegrams from the United States for goods, which showed the urgency with which they were required and the extreme bareness of stocks. Mr. Brittain said statistics showed that these periods of depression invariably came about once in 10 years, and he thought, therefore, that there need not be any unusual alarm or discussion in connection with the present dullness of trade.

## IN A SUBSEQUENT CONVERSATION

with Mr. Brittain and Mr. David Ward (Mayor of Sheffield), I learned, privately, particulars which quite confirmed the accuracy of what the former gentleman had just before declared in public. Mr. Brittain is of opinion that stocks of hardware and many other kinds of manufactured articles are so low all over the world (with one or two exceptions in the Antipodes) that they must be replenished almost immediately, and that consequently the full revival of business cannot long be delayed. His own business, which is almost exclusively foreign, has recently afforded him ample and satisfactory proof of this. He, as well as the Mayor, is apparently convinced that your protective tariff is not destined to exist much longer in its present prohibitive shape, inasmuch as economic changes, the nature of which you may surmise, in the South and West will prove too strong for your Eastern protectionists, and bring about a change which the majority of Englishmen deem absolutely necessary for the continued prosperity of your great country. Mr. Ward, the Mayor of Sheffield, is, as you know, head of the great edge-tool and sheep-shear making houses of Ward & Payne. He has recently had a dispute with his grinders on

the subject of the introduction of machinery for making and grinding the shears, but by dint of firmness has triumphed. The machinery is now in working order, and Mr. Ward assured me that the results achieved are in every respect satisfactory—indeed, beyond his utmost expectations. The shears are cut out, shaped, finished and ground by mechanical means, and when completed they are not merely cheaper and more expeditiously produced, but are in all respects better and more uniform than the hand-made goods. There is virtually no competition whatever in this branch of business. The leading Sheffield makers (of whom Mr. Ward is foremost) stand on such strong ground that they are enabled to clear all before them. Large quantities are sent into the United States—chiefly, of course, to California and the Territories out West—where they can be imported, in spite of the duty, and sold in defiance of all comers. Other large and profitable markets are found in the great sheep-farming parts of Southern Africa, South America, Australia and New Zealand.

## THE MAY MEETINGS

are now in full swing here, and the streets are literally crowded with "good men and true" from all parts of the country, and even further afield. White ties and clerical habiliments predominate in the Strand and Fleet street, so that we are necessarily on our good behavior. The iron and steel men are also beginning to assemble in readiness for the Institute meetings on the three last days of the week, excepting Saturday. A very interesting gathering is anticipated, the chief item in the programme being, of course, the discussion of Messrs. Thomas and Gilchrist's new steel-making process by means of the dephosphorization of common pig iron in the Bessemer converter. Mr. Riley's new "brick" idea is also likely to be a revelation to many. You are aware that the Bessemer medal this year falls to the lot of Mr. Peter Cooper, of New York.

## THE EXHIBITION OF CUTLERY,

which has just been opened here under the auspices of the London Cutlery Company, is a most interesting collection of all kinds of cutting instruments and appliances. There are three principal classes—general cutlery, swords and surgical cutlery—as well as a large collection of antiquities lent by the South Kensington Department and the Sheffield Public Museum. There are no foreign exhibits, so that the competition is exclusively between the London and Sheffield houses, barring, as Paddy says, an example of plating from Birmingham, and a stand of emery and other polishing materials from a firm at Manchester. I have looked over the contents of every case in detail, and I am bound to state that the display does a great deal of credit to all concerned. I am, and have been for many years past, quite familiar with all the best and worst productions of Sheffield, and I am inclined to the belief that, although neither Rodgers & Sons, George Wostenholme's, Brookes & Crookes, Harrison Bros. & Howson and several other principal houses are represented, the work is superior in many respects to any turned out in recent years. London cutlery is, as a rule, good, but it is expensive and much of it of a "trade" nature, such as butchers', palette, &c. knives, tailors' shears, *et id hoc genus omne*. In the cutlery shops of the metropolis one workman frequently completes an article—from the rough forging up to the finished glazing! At Sheffield, on the other hand, the subdivision of labor is most fully carried out, the forger being nothing but a forger and so on, fully 30 persons taking part in the construction of a knife.

## THE CITY COMPANIES,

I may say, appear to be moving in the direction of reform at last, some of them being afraid, probably, of being roughly handled, in obedience to popular clamor, under the auspices of a Parliamentary Committee. Many of these ancient guilds are possessed of immense wealth (the accumulation of several centuries), which not a few of them have simply regarded as a means of eating and drinking in the most perfect style attainable. They can confer their freedom (which, in most cases, confers a Parliamentary vote in elections for the city), or it can be bought for sums ranging from £20 to £100. A further payment admits to the "Livery," or full membership, and election selects the Courts, Wardens and Masters, who have the reins of management. Several of these hoary guilds have had exhibitions, and a number have joined, or have promised to join, in a general scheme for the furtherance of technical education. A college and a large endowment for this purpose are being organized—and these, if properly attained and worked, ought to be of great service to the members of the several trades as well as to the public. Many of the companies have scarcely any connection with the trades they purport to represent. Thus the Master of the Cutlery Company here is a gentleman in the leather trade; one of the Court is in the tea trade, another is a solicitor, and so forth—in fact there are now but four cutlers connected with the society.

## SCOTCH PIG IRON

has been in rather strong request on the whole. The continuance of the Durham miners' strike has not only hindered Cleveland competition abroad, but also the imports into Scotland of pig from that district. There are now 252,674 tons in Connal's stores, against 173,796 tons this date last year. The total shipments to date are 36,186 tons in excess of those for last year. Writing from Glasgow, on May 3, James Watson & Co. reported: "The Scotch iron market opened buoyant on Monday forenoon, a large business being transacted up to 43/10½, cash, closing quieter in the afternoon at 43/7½ per ton. On Tuesday the price receded from 43/9 @ 43/5 per ton, and on the following day the market declined to 43/1, improving in the afternoon to 43/3, cash. Yesterday the tone was firmer, as high as 43/6 being paid, closing at 43/4 per ton, and to-day a moderate business has been done up to 43/7½, cash, closing sellers at 43/7, buyers at 43/6 per ton. Makers' prices are steady and the shipments are still large. There is almost no business doing in Middlesbrough iron, owing to the continuance of the Durham strike. The shipments last week were 17,

795 tons as compared with 8382 tons for the corresponding week of 1878." We quote:

G. M. B. at Glasgow.....	No. 1.	No. 2.
Gartsherrie.....	44/6	44/6
Coltness.....	43/6	44/9
Summerlee.....	43/6	44/6
Langloan.....	43/6	43/9
Camboe.....	45/6	43/6
Caldar, at Port Dundas.....	47/6	43/6
Glengarnock, at Ardrossan.....	46/6	43/6
Eglington.....	43/6	43/6
Dalmellington.....	43/6	43/6
Shotts, at Leith.....	49/6	44/9

## A LARGE AMERICAN ORDER

is reported to have been received during the past few days for hematite pig iron by a house on the west coast of England—that is to say, in Cumberland. I am quite unable to state whether the report is or is not authentic, but the statement in circulation is that the order is for 12,000 tons of these (high-class) pigs, and that the price is very little, if anything, over 50/ per ton. This quotation is, I presume, *f. o. b.*, seeing that almost all the hematite works from Barrow, Ulverston, &c., up to the Solway, are situated close to the coast line. The freight to your Eastern ports will range from 2/6 to 5/ per ton, figures which will enable you to compare the quotations, delivered, with those on your side.

## YOUR OIL TRADE,

particularly the Standard Company and the Bradford district producers, ought to "read, mark, learn and inwardly digest" the subjoined remarks of a correspondent of the *Ironmonger*, in view of the present unpopularity in Europe of certain recent doings among your refiners:

"During the prevalence of extreme prices in the coal trade, several of the mineral oil companies were all but ruined; but now they appear not only to have recovered the ground they then lost, but are in a position to pay very good dividends. Young's Paraffine Light and Mineral Oil Company, whose headquarters are at Glasgow, are understood to be doing a good and profitable business, and in this they do not stand alone. The Oakbank Oil Company, for example, after providing for maintenance and depreciation of works, have agreed to pay a dividend this month to the shareholders of 20 per cent. for the past twelve months, and the shares of the company have improved from 40/ to 43/6. The Broxburn Oil Company held their annual meeting in Glasgow on Monday, and declared a dividend of 9 per cent., after providing for depreciation of works and the whole expenses of the formation of the company, carrying forward, besides, £1875 to the reserve fund. The 210 shares of this company are now selling at £13.15/7. This measure of prosperity is somewhat remarkable in these dull times, and there can be little doubt that the prices of these oils to the consumer will ere long be considerably reduced."

## SULPHIDES FOR FUEL,

as used by Mr. Hollway's new process, is a subject which will, no doubt, receive early and careful attention on your side, especially in the copper districts of your Lake regions. Mr. Hollway, as you know, uses the sulphides in the Bessemer converter as a means of combustion, and has been fairly successful hitherto. His experiments last week at John Brown & Co.'s Works, Sheffield, were not nearly as thorough or as successful as former trials, but there appears to be little or no doubt of the complete practicability of the idea. A detailed report of a discussion on the matter appeared in the *Journal of the Society of Arts* of May 3.

## FROM SHEFFIELD

the current reports are rather contradictory, some writers on the trade of the locality being of opinion that there is not the slightest change for the better, while others are not only full of hope, but prepared with solid facts in support of what they allege. As I have already stated, the Master Cutler of Sheffield is among the hopeful ones, and in confirmation of his speech I have just received a private note, which is of an equally satisfactory nature. My correspondent says that he hears in many quarters not merely more hopeful expressions, but statements of an actual increase of orders. At more than one large establishment the men have been put on full time, and at others the working hours have been increased. He believes, indeed, that the tide has fully turned, and is of opinion that much of the better tone is attributable to American orders. In that he agrees with Mr. Brittain, and as both gentlemen are in a position to know whereof they speak, I am inclined to credit their assertions in preference to those made from the opposite point of view. I understand that the lighter industries have, so far, benefited most largely by the spurt, and that at the large iron and steel works there is still a great deal of plant unemployed.

## STAFFORDSHIRE AND BIRMINGHAM

furnish news which is of a moderately satisfactory character, although the cheerful tidings thence also refer to the light, or hardware industries. The blast furnaces and mills of South Staffordshire, Shropshire and Worcester are hardly any busier than heretofore, consequently the output of pig and finished iron is on a most limited scale. A few government orders of respectable proportions are in course of execution for naval and dockyard requisites, as well as for heavy tools, otherwise the latest tidings from the neighborhood under notice are devoid of material interest. The lock makers of Willenhall are moderately busy, and the chain and anchor producers of Dudley, Tipton, &c., are doing a tolerable business on government and general foreign and colonial account. At Wolverhampton and Birmingham the season industries—baths, traveling trunks and the like—are steadily engaged. The brass founders are very satisfactorily off for orders; indeed, this is a branch which has hardly felt the depression. Many kinds of light goods—hollow-ware, tools, washers, screws, cut nails, &c., are again 5 to 10 per cent. lower by increase of discounts.

## SOUTH WALES AND MONMOUTHSHIRE.

are rather busier, and preparations are in hand whereby the output of some of the large establishments can at any moment be doubled or trebled. At Dowlais and Ebbw Vale, for instance, there are hundreds of thousands of tons of Spanish, &c., ores in stock, and these are still being imported,

notwithstanding the sword which the Sidney Thomas-Gilchrist discovery suspends over the heads of the adventurers. The exports from Cardiff and Newport are tolerably well maintained. Last week they included 1025 tons of rails to Cronstadt and 323 tons to Vadevela from Dowlais, 750 tons of rails to Hummelvig from Rhymney, 5 tons to Syria, and 278 tons pig to San Francisco from Barnes, Guthrie & Co. From Newport 850 tons only were exported, whereas 3350 tons of ore were received inward. Tin plates at and near Swansea are quite steady all round.

## FOREIGN.

## FRANCE.

(Moniteur des Interests Matériels.)

PARIS, May 4, 1879.—*Métals*.—There has been a reaction due to the tariff uncertainties surrounding us, and to the unsatisfactory state of business in England. Copper has been quite weak; a decline of 5.75 francs has to be noted in Chili Bars and Best Selected English, of 1.25 in Ingots and 1.50 in Corocoro Ore. We quote: Chili Bars, 148.75 @ 153.75; Ingots, 156.25; Best Selected, 158.25, and Corocoro Ore, 157.50. Havre is steady; they quote Chili Bars between 150.25 and 155. Marseilles is firm and unaltered; they quote small Refined Ingots, 160; Sheet Copper, 186; Bolts, 190; Sheathing, 190, and Yellow Metal Sheathing, 175. Tin.—This metal has tended steadily downward; the decline has been 2.50 to 5 francs the 100 kilos. We quote: Banca, 102; Biliton, Straits and Australian, 188.25, and English, 177.50. A similar decline is reported from Marseilles, where they quote Banca, 100, and other sorts, 185. Lead.—There are but few purchasers, and prices have receded 1.50 to 2 francs. The quotation at Paris is 35 francs; Manufactured, 40. Havre is steady at 37.50 @ 37.50 for First Fusion Spanish, with no arrivals during the week. From Marseilles a sale for export of 2000 pigs San Luis brand is reported at 35.50, and another of 50 tons Soft Spanish at 34.50; 216 tons have sold to the city of Bourges at 35.54 francs. They quote Argenteiferous, 33 @ 35; Second Fusion and Antimonial, 32, and Manufactured, 38 @ 39. Spelter.—This metal is also quiet; the decline is slight, 25 @ 50c. We quote: Silesian, 40; other good sorts, 37.50 @ 40, and Sheet Zinc, 60. Havre is steady at 41 @ 42. Marseilles has given way; franc; they quote Sheet Zinc, 60 @ 24, and Old Remelted, 20 francs. Iron.—There is great animation at Paris, orders have been received on an extensive scale, and the upward tendency of prices can no longer be doubted. The North Sea Iron market is well sustained. The leading Paris concerns have been buying Merchant Iron at 145 francs, delivered at the works, and the probability is that next week more will have to be paid. Common forging iron has been done as high as 155 francs the 100 kilos. As has previously been hinted by us, the makers in the Sambre and other Belgian districts have also received upon an enhancement of prices. This shows that the improvement in France begins to influence adjoining regions. In the Haute-Marne, Merchant and other iron is firmly sustained in price; the fact is that the works there have booked as many orders as they can conveniently can. Meanwhile the Easter holidays have brought about a lull, but this being always the case, even in the briskest of spring seasons, no importance was attached to it. The Chalais-Longueval Works, of St. Etienne will be transferred to St. Nazaire, and the Biétrix Company will henceforth be mechanists merely. We hear they have just received large orders for machinery. The idea of transferring steel works from the interior to the coast seems to be a good one, for if they are to import ore, it will be all the cheaper. In the Meuse and Moselle the blast furnaces are endeavoring to fix the price of Pig Iron at 55 francs. Coal.—Consumption has continued actively, and supply is light. Strikes are feared in the North and Pas de Calais.

## BELGIUM.

(Revue Universelle.)

BRUSSELS, May 4, 1879.—*Iron*.—In the absence of large dealings during the week, ironmasters have been eagerly discussing the recent inventions made in England tending to cheapen steel production, and thus more and more doing away with iron in the near future. This being a question of vital importance, affecting such a large number of interests everywhere, it is not to be wondered at that the subject has become one of almost universal discussion in business circles in Belgium. To our countrymen who like to fill distant orders we recommend the Marvast-Bun Railroad in Roubaix. The law authorizing this road stipulates that whatever cannot be furnished at home shall have to be carried out by at least five foreign works. The length of the line will be 60 miles, and cost \$8,000,000. An English government agent is said to be at Mons to contract for Bolts, Rivets and Screws. Coal.—Quite an important adjudication for 200,000 tons Coal has come off simultaneously at Liege and Charleroi for supplying the state railroads. The lowest price has been 9 francs per ton, and the highest 5.50 per ton. This is a low figure, and shows a notable decline since the September adjudication for a government supply. A strike is announced from Flémus and Belle-E-Bonne, 7500 Coal miners having struck who insist upon higher wages than 2 francs maximum per diem.

## GERMANY.

(Borussische.)

HAMBURG, May 3, 1879.—*Métals*.—The agitation going on in business circles about the new tariff law to be inaugurated has had a quieting effect upon the Metal markets in Germany, and this tranquillity has been the cause of the unsatisfactory trade aspect elsewhere, especially in England. It cannot be denied that the spring trade has been much interfered with by this economical warfare in which most powerful concerns are diametrically opposed to each other, deterring people from buying goods, because they do not know what they may be worth to-morrow. But our consumers have lost little by it, for if the improvement in Metal had continued they would have bought a supply at rates a great deal dearer than any of the Metals will cost them to-day, the decline being a general one, in view of the extraordinary overproduction going on on all hands every one of them. Copper has been quiet but firm at 67.50 @ 69 at Berlin, and at 67 1/2 marks the 50 kilos here. Tin has been slightly more active, at 73 @ 76.50 at Berlin, and at 73 @ 76 here. Lead.—The German markets are decidedly weak; Turnowitz, Harz and Saxonian has sold at 14.75 @ 15 at Berlin, and the various sorts here have been neglected at 15 @ 18.50. Spelter.—Prices have declined to such a low figure that producers withdraw from the market and stocks are now diminishing.

Steel for the Brooklyn Bridge.—President Henry C. Murphy has mailed recently to steel makers in all parts of the country the following circular, which explains itself: "You are hereby informed that the time for receiving sealed proposals, by the trustees of the New York and Brooklyn Bridge, for the steel and ironwork of the suspended superstructure of the East River Bridge, agreeably to the specifications heretofore issued and communicated to you, is hereby extended until the 26th day of May, 1879, at 12 o'clock at noon, and you are requested to send in bids for crucible steel, which shall have the same consideration as other steel. No bids which have been sent in have been opened, but will remain unopened until the day and hour above mentioned, and parties making the same are at liberty to withdraw them and make others if they are so disposed. The object of this circular is merely to correct a misapprehension that crucible steel was excluded by the specifications from competition."

Register Harper has filed his report in the case of the Superior Iron Company against David Matthias and Springer Harbaugh.

In this case the Superior Iron Company filed a claim for \$300,796.10 against Springer Harbaugh as guarantor for David Matthias, who purchased the mills of this company. The register finds that of the sum mentioned, \$300,000 was in the shape of a mortgage and bonds, no part of which Harbaugh agreed to see paid. He was guarantor merely for the purchase money and an annual payment on account, but not for the bonds.

## Incrustation and Scale in Boilers.

From Messrs. Babcock & Wilcox's new catalogue, entitled "Useful Information Pertaining to the Generation and Use of Steam," we take the following in relation to the subject of incrustations and scale in steam boilers:

Nearly all waters contain foreign substances in greater or less degree, and though this may be a small amount in each gallon, it becomes of importance where large quantities are evaporated. For instance, a 100-horse-power boiler evaporates 30,000 lbs. water in 10 hours, or 390 tons per month; in the comparatively pure (Croton) water there would be 83 lbs. of solid matter in that quantity, and in many kinds of spring water as much as 2000 lbs. The nature and hardness of the scale formed by this matter will depend upon the kind of substances held in solution and suspension. Analysis of a great variety of incrustations show that carbonate and sulphate of lime form the larger part of all ordinary scale, that from carbonate being soft and granular and that from sulphate hard and crystalline. Organic substances in connection with carbonate of lime will also make a hard and troublesome scale. The presence of scale or sediment in a boiler results in loss of fuel, burning and cracking of the boiler, predisposes to explosion, and leads to extensive repairs. It is estimated that the presence of one-sixteenth inch of scale causes a loss of 13 per cent. of fuel; one-quarter inch, 38 per cent., and one-half inch, 60 per cent. The Railway Master Mechanics' Association of the United States estimates that the loss of fuel, extra repairs, &c., due to incrustation amount to an average of \$750 per annum for every locomotive in the Middle and Western States, and it must be nearly the same for the same power in stationary boilers. It is absolutely essential to the successful use of any boiler, except in pure water, that it be accessible for the removal of scale, for though a rapid circulation of water will delay the deposit, and certain chemicals introduced into the water will lessen it, yet the only certain cure is periodical inspection and mechanical cleaning. This may, however, be rendered less frequently necessary and the use of very bad water more practical by the use of some preventives. The following are a fair sample of those in use, with their results: Waters containing bicarbonate of lime in solution may be caused to deposit a considerable portion of the same by simply heating to 212 degrees, which draws off a portion of carbonic acid and reduces the bicarbonate to the insoluble carbonate. This principle is the basis of a large number of heaters and "lime catchers," but it has no effect on other impurities.

The addition of milk of lime or metallic zinc has a similar effect, and they have been used with success in waters charged with bicarbonate of lime, but on sulphate of lime they have no action. Oak, hemlock, and other barks and woods, sumac, catechu, logwood, &c., are effective in waters containing carbonate of lime or magnesia, by reason of their tannic acid, but are injurious to the iron and not to be recommended. Molasses, cane juice, vinegar, fruits, distillery slops, &c., have been used with success so far as scale is concerned, by reason of the acetic acid which they contain, but this is even more injurious to the iron than tannic acid, while the organic matter forms a scale with sulphate of lime when it is present. All "anti-incrustations" containing organic matter are to be avoided. M. Bidard's observations show that they help rather than hinder incrustation. Barrino chloride and milk of lime are used with good effect at Krupp's works, in Prussia, for waters impregnated with gypsum. Soda ash and other alkalis are very useful in waters containing sulphate of lime, by converting it into a carbonate, and so forming a soft scale easily cleaned. But when used in success they cause foaming, particularly where there is oil coming from the engine, with which they form soap. All soapy substances are objectionable for the same reason. Petroleum has been much used of late years. It acts best in waters in which sulphate of lime predominates. As crude petroleum, however, sometimes helps in forming a very injurious crust, the refined should only be used. Rogers' tannate of soda is probably the best preparation for general use, but in waters containing much sulphate, it should be supplemented by a portion of carbonate of soda. For muddy water, particularly if it contains salts of lime, no prevention of incrustation will prevail except filtration; in almost every instance the use of a filter, either alone or in connection with some means of precipitating the solid matter from solution, will be found very desirable. In all cases where impure or hard waters are used, frequent "blowing" from the mud-drum is necessary to carry off the accumulated matter, which, if allowed to remain, would form scale.

The Destruction of the Stanton Coal Breaker.—On the 18th inst. the famous Stanton coal breaker, at Wilkesbarre, owned by Charles Parrish & Co., was destroyed by fire. The burned breaker is said to have been the largest in the United States. Its machinery was of the very best description and very powerful. It was capable of hauling and crushing 1500 tons of coal a day. The bull pump for keeping the mine free of water cost \$40,000. All the other machinery in the breaker was on a gigantic scale. The origin of the conflagration was the mine fire, which was at the time raging, and which had, it will be remembered, caused an explosion fatal to a number of miners. The value of the property destroyed is roughly estimated at \$500,000.



[Continued from page 15.]  
**The American Institute of Mining Engineers.**

Supper was served in spacious tents on the lawn, and excellent music was furnished by a symphony quartet in the music-room.

**THE PRESENTATION TO A. L. HOLLEY.**

The selection of this time and place for a surprise, in the form of a presentation to Mr. A. L. Holley, of a silver pitcher and salver of unusual value and beauty, was a happy thought. While the company were at supper on the lawn the dining-room of the house was closed, and the gift placed in position and covered. About 11 o'clock the doors were opened; Mr. Holley, surprised and bewildered, was led in, and the guests quickly filled the room. Mr. Shinn spoke as follows:

**Ladies and Gentlemen:** Allow me to claim your attention for a few moments. A once prominent railroad official was known to define an engineer as a "man who knew what he wanted to do and how to do it," and he added, by way of illustration, that he was an engineer in that sense. The definition is not so wide of the mark as the application. This gentleman was well known as never knowing either what he wanted to do or how to do it. It must, therefore, be evident that a "mining engineer" is one who wants to mine, and knows how. In this sense I fear that many of us are in the same category with the railroad official referred to. Some of us sport the title of "civil engineer." It is presumably a reasonable requirement of all engineers to be civil, yet some of us find even that task difficult. There are yet others who masquerade under the designation of "mechanical engineers," and there is one of our number who has imposed upon a too credulous and confiding public with this title and sundry others, to which I will refer, until "furtherance has ceased to be a virtue," and it has fallen upon me to expose him before this intelligent audience.

This gentleman, for such he seems to be, appeared in this vicinity some years ago, and his theme was "blowing Bessemer steel." His ambition appeared to be to blow about something, and his greatest desire was to "blow a heat." This gentleman was always descending upon converting things—and people. He made some converts and some converts, but such a failure was he in this direction, that those who came in contact with his converts found themselves consigned to a better place than they had ever reached before.

The most remarkable characteristic of the converts of this gentleman's converts, is that they are always inclined to steel. This gentleman also indulges in the title of "consulting engineer," and frequently favors his victims—whom he is pleased to call his clients—with a visit for consultation. This visit results in his finding out all we know, and in return he confidentially tells us all that he doesn't know, and there is so much of the latter that he seems to doubt whether what he gets from us is a full equivalent. He occasionally goes abroad, to England and the Continent, and favors our foreign friends by "consulting" them in like manner. Anon, he talks of "basic linings," as if his ordinary schemes were not base enough; and you have heard him at this very meeting hold forth upon "economical gas producers," as if such articles were valuable anywhere outside of Congress and our State legislatures. But his propositions are so plausible, his manner so winning, his countenance so frank and open-hearted like, and his gas so overpowering, that he has admirers who still insist upon doing him honor; and it is because of this that I have sought to place before you the facts in regard to this gentleman's true characteristics, lest you might be misled into that confidence the burden of which these misguided persons have laid upon me this evening.

This gentleman's name you perhaps have heard, for it has a habit of getting into print—it is Alexander Lyman Holley. After all, Mr. Holley's blowing has been for Bessemer, for Siemens, for Tiesse du Motay, for anybody and everybody except Holley; and that victimized few, whose representative I appear here to-night, have resolved that one blow at least shall be struck for Alexander Lyman Holley.

Mr. Holley: In behalf of a few of those whose lives you have made a burden by teaching them the pathway to success in making Bessemer steel, and then leaving them to the mercy of the mathematician and the chemist—with their "analyses" and their "formulas," their moments of "this" and their units of "that"—I present you this testimonial, which I find characterized in the official catalogue as a "pitcher upon a plateau," which is the "pitcher" you can doubtless perceive; which is the "plateau," I leave for your patient and careful investigation, believing that, as in other cases which you have undertaken, science will finally triumph and the "plateau" will be discovered. The catalogue further states that the figures on the pitcher are a symbolical representation of "art chasing nature." It is an undoubted fact that nature needs chasing, as witness the too plentiful phosphorus in the convenient pig iron; and as the art of Thomas & Gilchrist has now succeeded in chasing it out, so has your art chased nature out of many of her strongholds and forced her to deliver up her secrets to science.

In behalf of those whose names are recorded herein, I beg that you will accept this testimonial as but a slight evidence of their appreciation of your great professional ability, your high moral worth, and as an indication of their steadfast friendship.

The gift was uncovered, and after a moment of embarrassed silence Mr. Holley, with tremulous voice, responded as follows:

Mr. Shinn, I thank you for the kind and elegant manner in which you have presented this lovely gift; it is not only a surprise but an astonishment, so much so that I am utterly unprepared to properly respond.

My kind friends have intended this delightful presentation as a recognition of my

contribution to the development of our Bessemer manufacture. I am disposed to be a modest man, but there is one thing which I certainly do claim to know more intimately than most people, and that is who contributed to that somewhat remarkable development and what each one contributed. I am so proud to be recognized as one of the dozen men—(pointing to Capt. W. R. Jones) here is a conspicuous member of that dozen—who in the way of good mechanical engineering on the part of some of us, and good management on the part of others, have put the Bessemer process in the high and successful position which it occupies to-day.

But, Sir, one of the first principles of our profession is to make constructions only upon mature working drawings. This surprise is so complete that I have had no chance to work up drawings and specifications of a suitable response; but that I will endeavor to do when I can more completely express my overwhelming feelings.

Among us all who are working hard in our noble profession and are keeping the fires of metallurgy aglow, such occasions as this should also kindle a flame of good fellowship and affection which will burn to the end.

Burn to the end—perhaps some of us should think of that, who are burning the candle at both ends. Ah! well, may it so happen to us that when at last this vital spark is oxidized, when this combustible has put on combustion, when this living fire flutters thin and pale at the lips, some kindly hand may turn us down, not under-blown—by all means not overblown—some loving hand may turn us down, that we may perhaps be cast in a better mold.

The gift has a value of \$1250, but knowing the feelings which prompted the presentation, and the love which those who gave it bear him, to the recipient it must be priceless. A card secured to the lining of the case bore the following inscription:

Testimonial of appreciation and regard to Alexander Lyman Holley, from his friends, W. R. Jones, Morrell, Corning, Shinn, Griswold, Metcalf, Hunt, Wellman, Kennedy, Frits, Hartman, Park, Lapsley, Teeter, Worthington, Hines, Perry, Fry, D. N. Jones, Marvin, Hamilton, Ricketson, Hemphill, Forsythe, Potter, McCandless, Kinard.

To all but the donors the presentation was a complete surprise. Mr. Holley's pathetic response brought tears to the eyes of most of those who heard it. As he will be on the ocean en route for Europe before these lines reach our readers, we are sure that many will join us in wishing him a pleasant voyage and a safe return to home and friends.

**Friday's Session and Excursion.**

The last session for papers and business was held Friday morning. Mr. Thos. F. Witherbee, of Port Henry, N. Y., gave some account of "The Three Hearths at the Cedar Point Furnace;" Mr. Wm. Kent described an interesting apparatus for testing the resistance of metals to repeated shocks, accompanied by a very able exposition of the importance of making such tests in connection with those made to ascertain the ability to resist severe strains. The apparatus is a machine by which metals may be tested by repeated blows, numbering millions, if necessary. The test piece is a round rod of convenient length and diameter, and the blows are applied in the direction of the length, as in tension tests. A small nut, or anvil, is screwed or otherwise fastened on the bottom of the rod, and an annular weight is caused to drop repeatedly upon the anvil, by means of a rotating cam. The whole machine is built as rigidly as possible, to prevent spring, and the anvil being made strong to avoid the absorption, by its inertia, of the energy of the blow, the whole of the latter is transmitted to the test piece, straining it in the direction of its length. The weight of the drop being known and the height of fall uniformly adjusted, each blow gives an impact of the same number of foot-pounds. A revolution counter attached to the driving shaft, indicates the number of blows that are given.

President Cox made some remarks on the subject of anthracite coal breaking, and exhibited a form of tooth which wore out without changing its shape.

Mr. W. E. C. Cox, of the Reading Railroad, spoke in reference to the comparative durability of iron and steel rails. He maintained that there was not a great difference between the best iron and best steel rails. Mr. Stone, in a paper read before the Iron and Steel Association, had stated that a steel rail would last as long as 25 iron rails. Mr. Cox thought the proportion was about five to three in favor of steel, when the best specimens are taken.

A paper on "Phosphorus in Bituminous Coal" was to have been read by Mr. A. S. McCreath, chemist of the State General Survey, but as it had been printed and distributed among the members, the author merely answered a few questions called out by the desire for further information.

A paper prepared by Prof. Charles E. Wait, on "Antimony Deposits in Arkansas," was read by the secretary. A communication was read from the Association of Mining Engineers, of Montreal, inviting the American Institute to hold its next session in that city; and also a communication signed by a large number of prominent citizens of that city, endorsing the invitation. The Chairman stated that the council had accepted the invitation, and that the next meeting would be held in September.

Resolutions of thanks to the railroad companies, to the managers of metallurgical and manufacturing works and the press, were adopted, and the meeting adjourned finally.

In the afternoon an excursion was made to the Edgar Thomson Steel Works and to the United States Iron and Tin Plate Works.

**THE DINNER.**

Friday evening the subscription dinner, which has become a feature of the meetings of the Institute, was given in the new building of the Duquesne Club. About 150 gentlemen and ladies attended, and enjoyed the ample feast and the speeches which followed. The banquet was a success in every particular. Mr. Ricketson, Mr. Weeks, Mr. Metcalf, Dr. Raymond, Mr. Holley, Mr. Park, Prof. Langley and others responded to toasts, and the average of the post-prandial eloquence was much higher than is usual on such occasions. The ladies, for most of whom it was a new experience, enjoyed it immensely, and voted with one accord that henceforth they would accompany their husbands, or brothers or fathers, as the case might be, to the meetings of the Institute.

**Saturday's Excursions.**

Saturday brought the members the disagreeable necessity of choosing between two equally agreeable excursions—to the oil regions of Butler County and to the Connelville Coke district.

The excursion to the oil region left the Union Depot about 25 minutes after eight o'clock, on a special train furnished by the Pennsylvania Railroad Company. There were some 70 or 80 persons in the party, including a dozen or more ladies. The train went to Butler over the West Pennsylvania road, thence by a special train over the Butler, Karns City and Parker Narrow Gauge railroad to Parker, and there took a special train on the Allegheny Valley Railroad. The first stop on the West Pennsylvania road was made at Sharpsburg, where the train was run up to Spang, Chalfant & Co.'s mill. Here the process of making lap-welded tubes, &c., was thoroughly investigated. The chief matter of interest to the visitors was the natural gas used in all the furnaces for fuel. This gas is brought in a pipe line from a natural gas well at Saxonburg, 17 miles from the mill. After leaving the mill the next stop was made at Saxonburg, where the gas well was visited. The well not only supplies far more gas than the mill can use, but more than can be utilized by the Carbon Black Manufacturing Company, which has a large establishment at Saxonburg. In addition to supplying an immense quantity of gas to those two works, a huge flame is burning constantly at the top of a large pipe, about 15 feet above the ground. From this pipe the gas escapes with a roaring noise, and the heat made by the flame can be felt for a considerable distance. The Carbon Black Works were visited by all, even the ladies, notwithstanding the heat of the works and the soot that covered everything.

After leaving Saxonburg no stops were made until Butler was reached, where a change was made to a special train on the Butler, Karns City and Parker Narrow Gauge road. On this road about the only stop made was at Carbon Center, where the oil wells of H. L. Taylor & Co. were inspected, as well as a pipe line pumping station. Another stop was made on the way to Parker, to allow the excursionists to look at some very high trestle work where the train crosses a deep ravine. At Parker City the train was run over to the Allegheny Valley Railroad, where a special train was in waiting. This train was run up to Foxburg, where a stop of about an hour was made, and a substantial dinner, served by the Foxburg House, was enjoyed by the hungry visitors. Leaving Foxburg about 3 o'clock, a very rapid run was made to Pittsburgh, the 88 miles being made in about 2 hours and 25 minutes, including stops. It was in every respect a delightful trip, and one long to be remembered by those who took part in it. One of the new open observation cars of the Pennsylvania Road was attached to the train on the West Pennsylvania road, and on the Allegheny Valley road.

The trip to the coke district presented fewer features of novelty, but all who went on it congratulated themselves that they had made so wise a choice. As this district was fully described in our issue of January 16, 1879, with a map, we need not recount the incidents of the trip. Mr. Joseph D. Weeks commanded the excursion, and carried it through in good style. The works visited were those of Brown & Cochrane, H. C. Frick & Co. and A. A. Hutchinson & Bro. At Frick & Co.'s a mine was visited, which gave the visitors a chance to inspect the celebrated Connelville coal seam, which is here worked 9 feet in the clear. The vein is thicker than this, but as the slate does not make a very good roof, a portion of the coal is left to strengthen it. At Hutchinson's a number of ovens are building, which gave an opportunity to see the method of construction. The party then proceeded to Dunbar Furnace, where they were elegantly entertained by the Fayette County members, at the residence of Maj. A. B. De Saules, vice-president of the Furnace Co. Everything that goes to make up a first-class dinner was provided. The party were in good condition to accept of this hospitality, and never was a meal more heartily enjoyed. After dinner a meeting was organized and brief addresses were made by Joseph D. Weeks, A. H. Childs, Capt. Dravo and others. A resolution returning thanks to the Fayette County members was unanimously adopted. In the meantime about 10 of the party started to inspect the ore mine, and as they had failed to put in an appearance at the time

appointed for the return trip, the train, after waiting half an hour, started without them and arrived in the city shortly after 6 o'clock. Through the courtesy of the management of the Baltimore & Ohio Railroad, the party left behind were enabled to board the mail train, and they arrived in the city two hours later. Saturday evening many of the members left for their homes, and the party broke up.

A remarkable feature of this meeting, in addition to the large attendance, was the great increase in membership. The following is a list of new members elected:

Octave Chantre, chief engineer N. Y., Erie and W. R. R.  
 Luther S. Bent, general superintendent Pennsylvania Steel Works, Harrisburg, Pa.  
 George Barlow, chemist O. & S. Co., Cleveland, Ohio.  
 Orlando Metcalf, Pittsburgh, Pa.  
 Edwin Harrison, St. Louis, Mo.  
 Ray Thompson, Troy, N. Y.  
 Samuel L. Mather, Cleveland, Ohio.  
 C. Davis, Allegheny, Pa.  
 Prof. H. B. Nason, Rensselaer Poly. Inst., Troy, N. Y.  
 Frank P. Howe, Keystone Furnace Co., Reading, Pa.  
 James W. Neill, New Orleans, La.  
 Alfred E. Hunt, Nashua, N. H., and S. Co., Nashua, N. H.  
 William F. Zimmermann, Pittsburgh Car Wheel Works, Allegheny, Pa.  
 James B. Wright, superintendent Calumet and Hecla Mines, Michigan.  
 Henry R. Worthington, New York.  
 Joseph W. DeBardeleben, Birmmham, Ala.  
 William White, Edgar Thomson Steel Works, Braddock, Pa.  
 Geo. Webb, engineer Cambria Iron Works, Johnstown, Pa.  
 E. C. Van Blarcom, Richmond Consol. Mining Co., Europe, N. Y.  
 J. C. Temple, Globe Iron Works, Dayton, Ohio.  
 Wm. Swindell, Pittsburgh, Pa.  
 G. A. Steiner, Pittsburgh, Pa.  
 John C. Speer, Pittsburgh, Pa.  
 James S. Cade, Albany and Rensselaer Steel Works, Troy, N. Y.  
 Alfred R. C. Silwyn, director Geological Survey, Montreal, Canada.  
 L. A. Boly, O. & S. Co., Cleveland, Ohio.  
 John Rindard, Edgar Thomson Steel Works, Braddock, Pa.  
 Henry W. Rathbone, Elmira Rolling Mill Co., Elmira, N. Y.  
 Chas. S. Price, Johnstown, Pa.  
 Richard A. D. Parrott, Greenwood Iron Works, Greenwood, N. Y.  
 Ferguson G. Parker, Cambria Iron Co., Johnstown, Pa.  
 Wm. Hamilton Merritt, St. Catharines, Ontario.  
 Wm. Lilly, Mauch Chunk, Pa.  
 Alex. J. Leith, manager Joliet I. and S. Co., Chicago, Ill.  
 Julius Kennedy, Edgar Thomson Steel Works, Braddock, Pa.  
 Reese James, Johnstown, Pa.  
 C. C. Husey, Johnstown, Pa.  
 Abraham T. Hay, Burlington, Iowa.  
 Wm. D. Hartup, Pittsburgh, Pa.  
 Henry Hargreaves, South Pittsburgh, Tenn.  
 Ignatius Hahn, Pittsburgh, Pa.  
 Paul A. Tuss, manager Laclede Rolling Mills, St. Louis, Mo.  
 Chas. A. Fitzhugh, Pittsburgh, Pa.  
 Henry F. DeBardeleben, Birmingham, Ala.  
 Wm. B. Crocker, New York.  
 Andrew Coghill, Brewster, N. Y.  
 Theodore Cooper, New York.  
 James Morgan, American Iron Works, Pittsburgh, Pa.  
 Edward L. Ford, American Iron Works, Pittsburgh, Pa.  
 Albert H. Childs, Allegheny, Pa.  
 H. C. Frick, Pittsburgh.  
 Walter S. Franklin, Ashland, Md.  
 Henry T. Townsend, Philadelphia.  
 Henry M. Curry, Pittsburgh.  
 Wm. L. Sealie, Pittsburgh.  
 H. T. Mann, Pittsburgh.  
 Chas. H. Morgan, Worcester, Mass.  
 Geo. L. Miller, LaSalle, Pa.  
 Thos. T. Morrill, Johnstown, Pa.  
 Jas. Laughlin, Jr., Pittsburgh.  
 Herbert Du Fay, Pittsburgh.  
 A. A. Hutchinson, Pittsburgh.  
 John D. Saunders, Mine la Motte, Mo.  
 F. Z. S. Challenberg, Irvine, Pa.  
 John I. Williams, Pittsburgh.  
 John T. Wilson, Pittsburgh.  
 Jas. H. Young, Pittsburgh.

The following gentlemen were elected associates:

Horace M. Barry, New York.  
 W. B. S. Reed, Brooklyn, N. Y.  
 T. S. H. Smith, Windsor, Dury County, Col.  
 Edgar Richards, New York.  
 Geo. F. Milliken, New York.  
 E. V. McCandless, Pittsburgh.

One word more about the hospitality extended to the Institute by the citizens of Pittsburgh. It was simply immense. Nothing was left undone by them which could in any way have contributed to the enjoyment of the members and ladies, and whatever they did was done with the thoroughness and precision of competent business men. The excursions, without exception, were managed perfectly, and there was not one delay nor one disappointment. To those who attended the Pittsburgh meeting, it will ever be a pleasant memory; to those who did not, it should be a life-long regret.

J. C. B.

**Increasing the Adhesion of Light Locomotives.**

The want of adhesion in light locomotives is a most serious obstacle to their introduction upon cheap railways. In locating such railways in rough countries, a considerable expense must be encountered in order to secure reasonable gradients which a light engine can overcome, for if the grades be sharp, the permanent way must be increased in weight and solidity in order to sustain the heavier engines necessary to overcome the grades. As ordinarily calculated, the tractive power of an engine is only equal to about one-fifth, or perhaps, under favorable circumstances, one-fourth of the weight resting upon the drivers. Hence it is that a light engine, which can have a considerable excess of adhesion over that due simply to the resting weight upon smooth drivers, is very desirable. We have recently examined some inventions of Mr. Geo. French, of 200½ East Twentieth-street, New York, which are intended to increase the adhesion of light engines without adding to their weight. One of these, and perhaps the most easily applied, is intended for light engines of the Mogul pattern, such as are extensively used in this country upon railways of the lightest kind. The construction of the engine in general is not changed, but the trailing wheels are furnished with a pair of grooved tires, the groove being just deep enough to firmly grasp the head of the rail. These wheels do not rest upon the track in the regular work of the engine, but when it is necessary to increase the adhesion, as upon an up grade, they are lowered, and the head of the rail is grasped in the grooves of the wheels. This gives all the adhesion needed. The jaws between which the driving boxes of these axles are held are not straight, but curved to a radius equal to the

distance of the centers of the middle wheels, consequently in rising and falling they move in an arc of a circle, which has the centers of middle drivers for its center. In this way they are free to revolve in the usual manner, and the action of the side rods are in no way hindered whether they are raised or lowered. The amount of adhesion which can be gained by a pair of grooved wheels of this kind is very great indeed. In some experiments which we have seen made with models, we judged that the adhesion was much more than doubled without any increase of weight. We saw a small model draw a very respectable load, upon a grade which was equal to about 680 feet to the mile, which is steeper than any grade we know of save those upon "mountain" roadways where cogged wheels are used. The amount of adhesion possible, with any given weight, is only limited by the strength of the material of which the tire is made. For light roads, which are to run into the country as feeders for trunk lines, this improvement seems likely to be valuable, as it will enable the lightest classes of engines to overcome steep grades with their ordinary loads, and without the assistance of heavy pushing engines. Mr. French has, in addition to this plan, another by which the truck wheels of a light engine can, upon grades, be utilized as drivers, and so increased adhesion be obtained. The grooved wheel, however, has many advantages over the other plan. As the wheel does not come into play except upon grades, or when extra power is needed, there is said to be no difficulty in passing frogs and switches. Owing to its peculiar construction, we think the wheel might run over a frog or pass switches without difficulty. For mining roads, engines upon this plan would seem to be especially valuable, as their light weight would render it possible to build a very cheap permanent way, while their great tractive power would enable them to haul large loads over the roughest country.

**Colliery Explosions.**

At a recent meeting of the Royal Society, Mr. W. Galloway made a communication embodying the results of experiments he had conducted on the influence of coal dust in colliery explosions. This is the second paper he has written on the subject. Those who are interested in the questions connected with coal-mine explosions will find that Mr. Galloway has investigated several of the causes that originate them. In his former paper he stated that a certain mixture of air and coal dust, not inflammable at ordinary pressure and temperature, becomes so when 0.892 per cent. of fire-damp (by volume) or more is added. It then burns freely with a red, smoky flame. In a dry and dusty mine an explosion may extend itself to remote parts of the workings where fire-damp is quite unsuspected. The wetness or dryness of the workings depends on the temperature of the strata in which they are situated, for if the temperature of the mine is lower than the dew point of the air at the surface, the ventilating current will deposit moisture as it becomes cooled in passing through the workings; and if, on the other hand, the temperature of the mine is higher than the dew point at the surface, the ventilating current will absorb moisture and tend to produce a state of dryness. He then pointed out that the temperature of the strata in the coal measures of this country increases at the rate of about 1° F. for every 60 feet below the surface, and therefore the comparative wetness and dryness of a mine depends on its depth. He has found that his own observations gave these results, that mines shallower than 400 feet are damp, and those deeper than 700 feet are dry and dusty. Between the 400 feet and 700 feet there is a kind of debatable ground, in which wetness or dryness depends for the time being on the temperature of the air entering the mine at the surface.

In all dry coal mines the coal dust lying on the floor of the roadway rises in clouds and fills the air when it is disturbed by the passage of men, horses and wagons, and a sudden puff of air, such as that produced by a local explosion of fire-damp, or by a shot blowing its tamping, must necessarily produce the same effect in a greater or less degree, according to its intensity. Although 0.892 per cent. of fire-damp will cause an explosion, it is probable that under compression in a confined space a less amount may have the same effect. Mr. Galloway propounded the theory that some kinds of coal dust may, perhaps, require less fire-damp than others to render their mixture with air inflammable, and suggested that still other kinds may form inflammable mixtures with pure air. On the other hand, he mentioned an experiment with the return air of a mine, where he found the air had to be black with dust before ignition occurred. He mentioned that it was a favorite theory that fire-damp suddenly bursting from strata would cause an explosion of wide extent, and that traces of it could afterward be found in the charring of the timber used in the mine. This so-called appearance of charring was, he said, due to a coating of the coked coal dust adhering superficially. The practical suggestion made was that roadways in mines should be kept well watered to lay the coal dust. In the case of the Dinas explosion (of the 13th of January), he had found, on his last visit before the explosion, that the water carts were not being used. The manner, he said, in which coal dust operates in setting fire to coal and timber, is probably as follows: The air is traveling rapidly in one direction along a gallery, throwing a continuous shower of dust, small pieces of coal, &c., against all surfaces in its course. At the instant the flame traverses the air the dust is thrown, and rapidly accumulates until it forms a crust of greater or less thickness, according to the length of time the air continues to travel in the same direction. If there is enough of air it will continue to burn; but if not, it is soon extinguished, a covering of "coke" results, and there is the appearance vulgarly called "charring."

The city councils of New Albany, Ind., have exempted the Star Glass Works from municipal taxation.



## FAMILY GRINDSTONE.



After much experimenting, we have now fully perfected our GRINDSTONE for family use, and offer it to the public with a FULL GUARANTEE that it is a perfect machine; and also that it will please every one who buys it. So far as we know, it is the first Foot-Power Machine which has been fully adapted to the wants of families for household work and of mechanics for grinding small tools. The stone is of the best quality, and runs perfectly true. It is 8 inches in diameter, 1 1/4 inches thick, and made at the Huron Quarries expressly for this use.

The EMERY WHEEL is the same size as the Stone, and double coated on the side and rim with best Wellington Mills Emery. When not in use, it is taken off and laid aside. A sponge is fastened in the side of the trough, to keep the Stone from throwing water when running at a high speed.

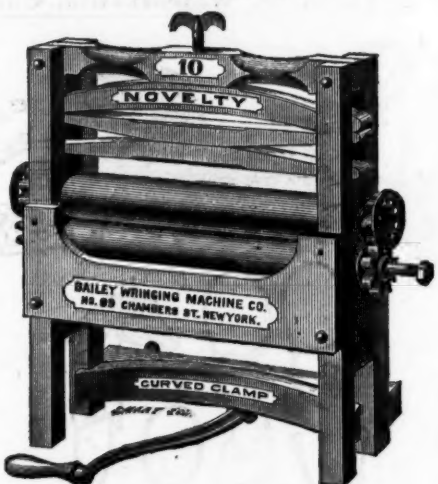
The Machine is run with a clutch, so that there can be no dead centers; but when the foot touches the treadle it starts off in the right direction, and runs at a very high or very low rate of speed, as desired. For grinding Carving Knives and all light tools, and for polishing Cutlery, this Machine is perfect. The legs are made to fold up for shipping, so as to occupy a small space. Weight, 26 pounds. Price, including box, \$3. It is for sale in MOST HARDWARE STORES in the country at our price, with a reasonable amount added for freight.

MILLERS FALLS CO.,

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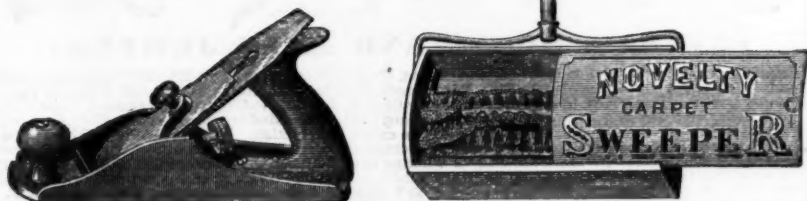
BAILEY WRINGING MACHINE CO.,  
No. 99 Chambers Street, New York.

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Defiance  
Metallic  
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SPECIAL QUOTATIONS ON THE ABOVE GOODS FOR EXPORT.  
Send for Illustrated Price List and Discount Sheet.

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## Automatic Self-Adjusting Iron Railway Cross-Tie.

These Cross-Ties have been in use since September 9, 1878, in a severe curve on the Philadelphia and Baltimore Central Railroad, with the most satisfactory results. The main features of this sleeper are:

1. It will save about one-half the labor.
2. It does away with all spikes, bolts, fish-plates, or joint straps.
3. It dispenses with drilling Bessemer steel rails, as every hole drilled is acknowledged to be an incipient fracture to the rail.
4. It will outwear twelve renewals of ordinary wood sleepers.
5. It has proved the most elastic sleeper in use, during all seasons.
6. It insures smooth and easy riding, with minimum wear and tear.
7. It was particularly noticed that it did not heave with the frost, while the wood ties that formed the connection with the iron ties, were heaved from 1 1/2 to 2 inches.
8. It will be seen that the more weight upon the rail the firmer it is held, with no possible chance of accident by the rails spreading.
9. It is a noticeable feature that the noise is much less, it being deadened by the elastic blocks which support the clamps.

For further information address

THOMAS W. TRAVIS,

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Can be applied wholly by boring, and is a sure protection against burglars or tramps.

MY NEW DOOR BOLT.

In Nickel plate or Bronze, is designed for both out and inside doors, your sleeping or bath-room, throughout a hotel, or on any door that may need inside Bolts. It will take the place of the more common Flush Bolt, being as easy to apply, leaving your door more secure and of better finish, and besides it fills the place of many a more expensive Bolt that operates no better or any more secure.

Agents: F. S. BRADLEY & CO., New Haven, Conn.; HENRY BROOKS & CO., 127 Milk St., Boston; S. T. LATHAM & CO., 417 Commerce St., Philadelphia, Pa. Price list sent on application.

MOBART H. IVES, Sole Manufacturer, Fair Haven, Conn.



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ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 30 styles.

ALSO LANE'S PORTABLE COFFEE ROASTER

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers.

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Horse Shoe & Nail Co.,

Successors to the

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MANUFACTURERS OF

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Horse Shoe Nails,

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Cowles Diamond Pointed  
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Genuine OLD RELIABLE,  
INDIAN POND (Red Ends),  
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Stones gotten up and labeled in  
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PRICE and QUALITY GUARANTEED.  
All the above Stones are of good  
keen grit and will not glaze.



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Manufacturer of all kinds of

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For Carriages, &c.

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Scales. Testing Machines any capacity.

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\$5 to \$25 and all the

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Arranged in three parts:

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Reliable, Comprehensive,  
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Every business man  
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Convenient for either  
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EDWARD B. LEIGH,  
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Or either of the Publishers, viz:  
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Established in 1839.

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GENUINE IMPROVED AND MECHANICS

Wide Bar Full Length.

Wide Bar Full Length.

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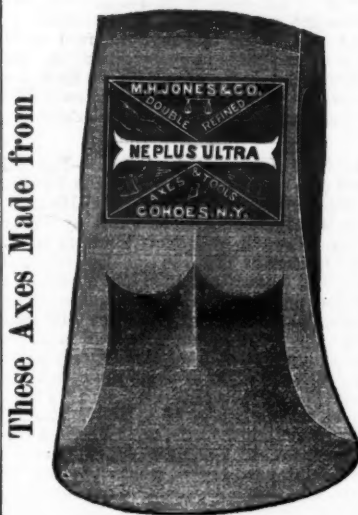
NOVEMBER 10, 1863,  
FEBRUARY 23, 1864,  
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The back thrust when in use borne by the SHANK instead of the Hand'e.

None genuine unless stamped "L. COES & CO."

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Firth's Best English Cast Steel.

## The 1879 Pennsylvania Lawn Mower.

LIGHT DRAFT AND EASILY ADJUSTED.

Every Machine Warranted to Work as Represented.



Points Claimed as being Meritorious:

1. Lightness, combined with Strength in Construction.
2. Ease of Adjustment.
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It is the lightest machine in use, and all that necessary to satisfy our customers of its superior  
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PRICE LIST.

Width of Cutter.	Style Driving Wheels.	Power required.	Weight.	Price.
10 inch.	A Child.	3 1/2 lbs.	18.00	\$14.00
12 "	" " " " " " " "	A Lad.	3 1/2 "	18.00
14 "	" " " " " " " "	A Lady.	36 "	20.00
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NEW MACHINES.

15 inch, 10 1/2 inch Driving Wheels, 6 1/2 inch Cylinder, Man Size, 48 lbs.	\$22.00
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Bit Braces,

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Comprising every grade of quality and finish, from the cheapest Farmers' Brace to the finest Steel Sweep, heavily nickel plated, with rose-wood handles, and ligum vitae heads, being the most complete line offered by any manufacturer in the country, and which for simplicity of construction and effectiveness have no equal. Catalogues and price lists furnished upon application at office and salesroom.

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## The London Exhibition of Cutlery.

The London Cutlery Company recently opened an exhibition, consisting entirely of specimens of cutlery shown by both manufacturers and workmen. The principal object of the company in promoting the exhibition was the advancement of technical education in all branches of the cutlery trade; and with this view they gave money prizes to artisans, and medal and certificate awards to manufacturers, with, in case of exceptional excellence, the freedom of the company. The Sheffield Cutlery Company co-operated with the London Company in carrying out the scheme, and several Sheffield manufacturers and artisans exhibited specimens of local work which, claims the Sheffield Daily Telegraph, "prove that the hands of Sheffield men have not lost their cunning in their own particular industries."

The South Kensington Museum exhibited more than 300 curious and ancient swords and pieces of cutlery, some of which a correspondent of the *Ironmonger* describes: "Among the more prominent weapons were a Tulwar sword, with curved watered blade and steel handle, damascened with gold; another Tulwar, with grooved and channelled blade, copper handle and guard, also engraved and damascened with gold; an Indian sword, with broad curved blade, strengthened at the back and lower part with extra damascened plates, and with a handle with a broad guard and projecting pommel, also damascened with gold; a Tulwar sword, with a grooved watered blade, stamped with an inscription, a silver handle and ornamental guard, with birds and flowers in translucent enamel; a Sukhela sword, having a long, straight, two-edged blade, thickened with extra plates at the lower part, the handle having a broad guard and projecting pommel; a Tulwar sword, with a curved blade and guard; a long sabre, with curved blade and jade handle, engraved with flowers; an Assamese (Indian) sword, with long steel blade, having a handle of iron and brass; a remarkable sword with a short curved blade and iron handle and guard, covered with silver and ornamented with a dragon's head at the extremity. This was a talismanic sword formerly belonging to the rebel Koer Singh, and taken from him during the mutiny in 1857. These weapons were mostly accompanied with their richly ornamented sheaths. In another case were specimens of ancient scissars, chateaux and sugar nippers of Italian and German make during the sixteenth and seventeenth centuries. A conspicuous feature in this case was a pair of shears, or betel cutters, of steel, elaborately chiseled and inlaid with silver and brass, terminating in the head of a bird. The design of this curiosity proclaimed it to be of Oriental origin. A third case was occupied with curious old forks and spoons, one of the latter being of dark red jasper, and another having a bowl of white shell and a stem of blue glass, with two balls at the end. Modern Turkish scissars, knives, forks and spoons, and Italian articles of a similar character, but of earlier date, were also shown in this case, together with specimens of Flemish, German, French and Norwegian manufacture. The most noticeable feature in another case was a dressing-case of tortoise shell of hexagonal shape, with silver lock, hamp, hinges, handle and chain. This contained a looking-glass, four tortoise-shell combs and thirteen other toilet necessities, mounted with silver. It is believed to have been given by Charles II. to a Mr. T. Campbell, who had sheltered him. In this case were also fine specimens of seventeenth century cutlery in the shape of knives and forks, and fantastically designed knives, &c. In the other cases were Persian daggers of every conceivable shape and size, and richly jeweled; curious old French knives of the sixteenth century and specimens of German cutlery. A curious old knife-case of carved wood, dated 1564, should, however, be noticed. Three satyrs bound to a triangular pillar form the case, which rests on three sphynxes, and the cover is surmounted by a sphynx holding a shield. The case contained six steel knives chased with gilt, each blade and handle being formed of one piece."

The workmen's show of cutlery was, it seems, very commendable. It dealt with the various stages of manufacture, from the rough forging to the grinding and finished glazing processes. The majority of the artisan exhibitors were rewarded with merit certificates and with sums of money.

The London Cutlery Company is a very old organization. Previous to the reign of Henry V, there were three trading fraternities or guilds in existence, viz., the Forgers of Blades, or Bladers, the Makers of Hafts and Sheath-makers. In the fifth year of the reign of Henry V, 1417, these were incorporated as one united body by the name and style of "The Master Wardens and Commonalty of the Mystery of Cutlers of London." Various other charters have been granted, viz., the charter under which the company is now governed, that granted by King James I, in the year 1607. This charter gives the company many powers, some of which had unfortunately died out. They had powers to make ordinances "for the government of all using the mystery, art or trade of cutlers within the City of London or suburbs thereof, and within three miles of the said city." To have a right of search, and to lay penalties for all "deceitful wares" (and some that were not deceitful.) In the year 1451 (29th Henry VI) the company purchased the Cloak Lane Estate, in which their hall was built. In the Great Fire of London, in the year 1666, 54 of the halls belonging to the city companies (including Cutlers' Hall) were destroyed. These halls were shortly afterward restored, and the present Cutlers' Hall, which was also rebuilt at that time, has been in use ever since. It was partly rebuilt in the year 1866. The great antiquity of the guild is undoubted, as, although the first charter was granted in 1417, it is on record that a grant of £4 toward the carrying on of his French wars was made to Edward III in the year 1355.

In the course of an after-dinner speech Mr. W. F. Brittain, master cutler of Sheffield, said that "in the past the English had been particularly desirous to meet foreign

competition, but he hoped that one result of this exhibition, and of its possible successors, would be an emulation between themselves—a friendly rivalry between Sheffield and London for the honor of turning out the best cutlery. When this exhibition was first mooted he called a meeting at the Cutlers' Hall, in Sheffield, at which many objections to the scheme were raised by manufacturers, on the ground that exhibitions of this class taught foreigners too much, and allowed them to gain information which enabled them to compete with England in the outside world. He succeeded, however, in overcoming these objections, and he was glad to see the admirable appearance which Sheffield goods made in the Exhibition. In Sheffield they had experienced terrible depression in trade, but he personally had endeavored to look at the matter philosophically, and on going into it statistically he found that there had always been periods of depression about every ten years, especially since the beginning of the present century. These periods of depression came on at comparatively regular intervals and were succeeded by times of prosperity. An improvement had already begun in the West, where they generally had the first symptoms of a revival. Sheffield houses were now experiencing a gradually increased demand from America, and many of them were daily receiving telegrams for goods. This was an extremely healthy sign. Mr. Brittain then referred to the subject of reciprocity, expressing the opinion that no system of reciprocity could be thorough or real until there was free trade in every direction. He hoped this Exhibition would be the first of a series which would help to benefit trade and improve the quality of cutlery generally."

**The New Jersey Ship Canal.**—The old subject of a ship canal to unite the Passaic and Hackensack rivers with the Hudson, and so effect a saving of 12 miles by water between Newark and New York, is again under discussion. The last Congress ordered a survey to be made by the government of a route for the proposed ship canal between Newark and New York. Three different routes have been submitted. One is direct from Newark Bay through the Curry property. This would necessitate a cutting through the Bergen Hill rock of 4732 feet, or about seven-eighths of a mile. The hill has an elevation of about 25 feet. The second route takes a diagonal course through the hill, and would save nearly 250 feet of cutting, and the third would follow a straight line from Newark Bay, near the Beacon Light, to a point midway between the two bays where they intersect the Morris Canal, and then follow the line of the canal all the way to New York Bay. No formal expression of opinion has yet been made, but it is believed that the canal is feasible and that it will be of enormous benefit to Newark, Jersey City and New York. No estimate of the cost has been made, but it will foot up at least \$2,000,000. Gen. Newton will make a report to the government.

**Expected Return of the Paris Exhibition.**—The United States Frigate Constitution, laden with goods from the late Paris Exposition, is now 40 days out from Lisbon, and may arrive at this port at any moment. All the necessary arrangements have been made at the Custom House for the prompt discharge of that portion of her cargo belonging to exhibitors from this city and the Eastern States. As soon as these packages are landed the vessel will at once proceed to Philadelphia, where the balance of her cargo will be discharged. Three days after the goods are delivered on the wharf at the Brooklyn Navy Yard the office of Commissioner-General McCormick, now in room 37 Post Office Building, will be discontinued and removed to Philadelphia, where it will be kept open two weeks.

**The Importance of Sanitary Engineering.**—Prof. Trowbridge, of the School of Mines, in a recent lecture before the Engineering Society, advised young engineers to give their attention to sanitary engineering, and reminded them that a problem worthy of the closest observation was the excessive cost of railroad transportation. The problem that now pressed upon them, said he, was of a social nature—how to prevent disease, and how to elevate the poorer classes. No doubt there would be a future in which the engineer, the capitalist and the statesman would unite for the promotion of human welfare.

Pittsburgh is reaping the benefit of a freight war, the schedule on fourth-class freights, in car loads, being lower than they have ever been before from that city eastward. The present rates on east-bound freight is as follows:

	Cts. per cwt.
Pittsburgh to Baltimore.....	95
" " Philadelphia.....	105
" " New York.....	125
" " Boston and Providence.....	175

The above rates apply only to fourth-class freight and grain in car loads. In less than car loads the figures that have been obtained for some time past will still remain in force.

## GREAT REDUCTION IN PRICES.

## CLIMAX REFRIGERATOR

And Water Cooler Combined.

Patented Dec. 2, 1873, June 1, 1875. No Drip Pan to Soil the Carpet. Self-purifying. Cold, dry and pure air. Inner case made entirely of Galvanized Iron. Send for catalogue and reduced price list.

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No. 390 Pearl Street, New York.

## ST. LOUIS IMPROVED

Coiled Wire

## DOOR SPRINGS

The Best, the easiest to adjust and Always the Cheapest.

## SIZES.

- No. 6, 12 inches long, for heavy doors and gates.
- No. 7, 11 inches long, for medium doors and gates.
- No. 8, 10 inches long, for light doors.
- No. 9, 9 inches long, for screen doors.

Special rates given on application.

COE, YONGE & CO.,

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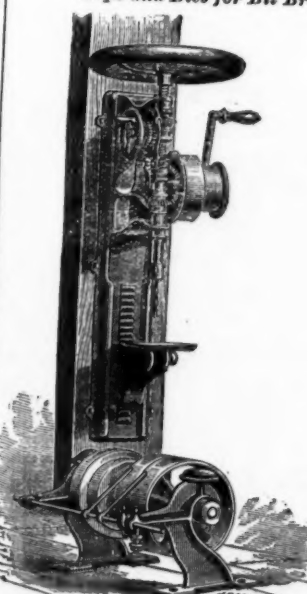
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## Wiley &amp; Russell Mfg. Co.,

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## LIGHTNING Screw-Cutting Machinery and Tools.

Bolt Cutters for Hand or Power, Lightning Screw Plates cutting from Wire Sizes to 1 1/2 inch. Pipe Taps and Dies, Taper Reamers for Use in Bit Braces or Wood or Iron, Taps and Dies for Bit Braces.



Green River Drills for either hand or power. Tire Benders. Tire Upsetters. Horse Shaver Machines. Tire Measuring Wheels. Tire Bolt Wrenches, Nut Wrenches, &c., &c. Special Screw Plates for use with stock or in the Bit Braces. Send for Illustrated Price List.

## VERMONT SNATH CO.,

Manufacturers of

## Pat. Swing Socket Snaths

and also a large variety of other styles of Snaths, Springfield, Vermont.



Brass Gears for Models, &c. (List free). Wood or Metal Patterns cut to order. Experimental Machinery, Models, Dies, Punches and Special Tools and articles made to order. D. GILBERT & SON, 213 Chester St., Philadelphia.

## ZERO REFRIGERATOR,

WITH Water, Wine and Milk Cooler.

The best Meat, Fruit and Ice keeper in the world. 35,000 in use. Grand Centennial award. ALEX. M. LESLEY, 372 Sixth Av., N. Y. Send for Catalogue.

## PATENT MINERAL WOOL,

Entirely fire-proof, undecaying and the best non-conductor of Heat, Cold and Sound. Used extensively for lining steam pipes and boilers, underground and open-air pipes, water tanks, refrigerators, cold storage houses, roofs and walls of dwellings, drying kilns, deadening floors of railway passenger cars, &c.

A. D. ELBERS, 284 Broadway, New York. Address P. O. Box 4461.

## "THE BOSS" JACK-SCREW.

R. D. WYNN,

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Sole manufacturer of the above Screw. Indorsed by builders, railroad and mining men as the best screw jack in the market. Also manufactures Press Screws, Lard and Wine Presses, Tackle Blocks, &c. Circulars and prices, address as above. (Please say *The Iron Age*.)

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Picture Nails, Knobs and Hooks, in great Variety. Gilt and Tinned Picture Wire, Twisted and Braided.

## American Cast Shears,

Sold by Hardware and Notion Dealers everywhere. Also Manufacturers of Shade Fixtures and Trimmings, Ink Stands, Twine Boxes, the Celebrated "Family" Egg Beater, Nutmeg Graters, Escutcheon Pins, Curtain Rings, &c., &c.

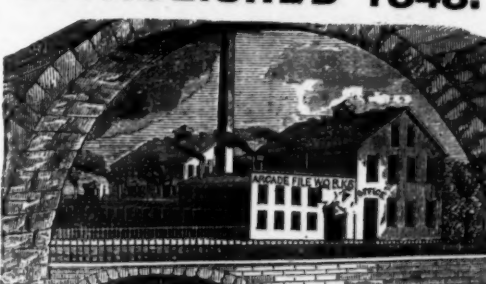
FACTORIES, Wolcottville, Conn.



## COVERT'S HORSE AND MULE JEWELRY.

Consisting of Covert's Celebrated Harness Snaps, Swivel Snaps, Open Eye Bit and Chain Snaps, Snap Leads, Leather Horse Ties, Breast Chains, Martingale Chains, Rein Chains, Post Chains, Post Rode, &c. These goods are far superior to anything of the kind on the market. They have from years in general and saddlery hardware at manufacturers' prices. Special attention is called to our new patented Rope Goods. No more braiding or winding ends with cord; all accomplished with machinery for clamping the rope with steel rings, which enables us to make better goods at reduced prices. Send for catalogue and price list. Address COVERT MFG. CO., Sole Manuf'rs, West Troy, N. Y.

## ESTABLISHED 1848.



## FILES and RASPS

Made from Best ENGLISH CAST STEEL. Quality guaranteed by written warranty when required.

## C. T. DRAPER &amp; CO.

Sing Sing, N. Y.

Manufacturers of "SUPERIOR HAND CUT"



## George N. Pierce &amp; Co.,

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Manufacturers of

## Bird Cages, Refrigerators

AND HOUSE FURNISHING GOODS.

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## GEORGE W. BRUCE,

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Agent for CLEMENT & MAYNARD'S Trowels, Hoop Shovels, Spades and Scoops. Their Trowels and Hoops have entirely supplanted the English by their quality and cheapness, while all their goods compare advantageously with those of other makers and are largely exported.

## Flanders' Improved Locomotive Cylinder Boring Machine.

Bar and screw of cast steel, with two extra cutter heads. Manufactured and for sale by the

L. B. FLANDERS MACHINE WORKS,

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Pocket Lamp & Match Safe Combined.

Just out, and the only perfect article of the kind; same size as an ordinary pocket match-box; heavily nickel-plated and of good solid workmanship; will burn oil or fluid without danger of leakage.

Send for circular to

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## CAULKING IRONS,

Cotton, Freight and Hay Hooks,

No. 258 Monroe Street,

Bet. Jackson & Corleaus Sts., NEW YORK.







The Detroit Post says that the Wyandotte mines have contracted for the delivery of 1,000 tons of ore the present season, and the stone furnace (stack) which has been out of blast for some time, is being put under to be blown in as soon as the first



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KEYSTONE SAW, TOOL,



STEEL and FILE WORKS,

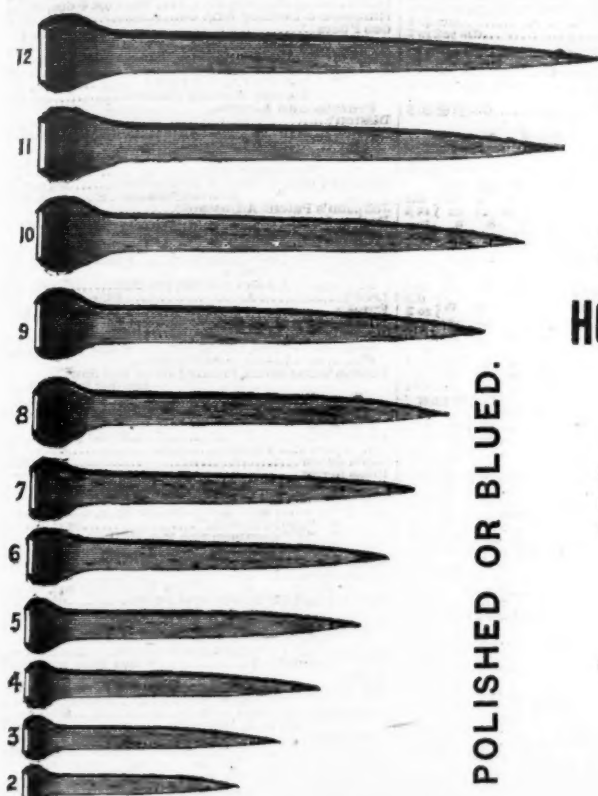
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MANUFACTURERS OF

SAWS OF ALL KINDS, FILES AND TOOLS, AND SPECIAL GOODS MADE FROM SHEET STEEL.

All goods stamped Henry Disston & Sons, and bearing our trade mark, are fully warranted.

Branch Works, Tacony, Philadelphia.

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POLISHED OR BLUED.

## AUSABLE HORSE NAILS,

Twisted, Bent and Drawn COLD.

Hot Forged and Cold Hammered Pointed,

Are the only Nails in market that are made in imitation of the Hand Process. They have the uniformity of Machine Nails and the toughness of those hammered by hand. Our

## HOT FORGED AND COLD HAMMERED POINTED NAILS

Are the Standard Nails,

and are acknowledged to be the best in the market. They are used by the best shoers in New York, Brooklyn, Philadelphia, Chicago, Saint Louis, Milwaukee, Baltimore, &c., and

GENERALLY THROUGHOUT THE UNITED STATES.

They also compete successfully in Foreign Countries with machine and hand-made Nails of their own manufacture.

AUSABLE HORSE NAIL CO.,

4 Warren St., New York.



Steam and Frost prevented on Show Windows.



## REVOLVING VENTILATORS

For everything (and every size), from a hat or cap to an exhibition building.

Kitchens, Laundries, &c., ventilated without draft. Durable, strong, without rivets or solder. Oiled for six months. Each one has storm cap. Retail price, size six inch diameter, \$1.00 and upwards; apparatus with which any one can cut circles in glass, 15 cents each.

Protective Ventilators avoid drafts, exclude dust, dampness, malaria and germs of disease; adopted by hospitals, schools, institutions, &c.; applied to any window or room.

Prof. A. L. LOOMIS, M. D., University of City of New York, writes as follows: "From my personal experience and that of my patients who have used your Ventilator during the past six months, I am convinced that your method of removing dust, impurities and dampness from the atmosphere is the best which has as yet been proposed. By it the air in an apartment can be constantly changed without causing drafts. I would especially recommend its adoption in sick rooms, sleeping apartments, nurseries and school rooms."

Air Filters and Moisteners, placed over hot-air registers of furnaces, &c., prevent dust and supply steam filtered air. Prices and discounts to the trade sent on application.

The "Economy" Molding Weather Strip is perfect in every respect. By enlarging edge of rubber or felt, and making slot in molding to correspond (see engraving), we save all after expense of molding. Once purchased it will last a lifetime, because rubber, etc., has only to be removed by taking old piece out of either end of molding, and sliding in a new piece. By this method of securing rubber all uncertainty of fastening or sending of glue or tacks is overcome. Rubber supplied with enlarged edge and instructions to enable Car Manufacturers, Carpenters, Builders and far off trade to make slots in Sashes, Doors, Mouldings, &c., and thus make perfect Weather Strips.

No. 6.



BRACHER VENTILATOR CO., No. 3 Park Row, New York.

THE PENFIELD BLOCK WORKS, Lockport, N. Y.

Manufacturers of

## PULLEY BLOCKS,

Iron and Wood,

Lignumvitæ Sheaves, Iron Sheaves, All Steel Roller Bushings, Common Sense Hoisting Blocks, Giant Car Pushers, Lock Faucets, &c.

All kinds Lignumvitæ Work. Ten-Pin Balls any size.

Headquarters for every style and kind of

TACKLE BLOCKS.



No. 11, Triple Block Iron Strapped.



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MANUFACTURERS OF

## COACH SCREWS

(With Gimlet Points),

ALL KINDS OF

Machine and Plow Bolts,

FORGED SET SCREWS,

AND

TAP BOLTS.



Mica and Porcelain Materials.

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Mica of the Best Quality,

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Quartz, the Finest, Whitest, Best.

Kaolin, Asbestos and Baryta.

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Bemis & Call Hardware & Tool Co.



## PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, case-hardened throughout, and not only combine all of the superior qualities of our Cylinder or Gas Pipe Wrenches, but also all requisite combinations of a regular Nut Wrench, thus making a combination which has no equal.

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BEMIS & CALL HARDWARE & TOOL CO., Springfield, Mass.

Bergen Port Spelter.

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Lehigh Valley, Pa. Bergen Port, N. J.  
The only Miners and Manufacturers of

## PURE LEHIGH SPELTER

From Lehigh Ore.

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Cartridge Metal and German Silver.

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Superior for LIQUID PAINT on account of its bod and wearing properties.

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Pumps, Lined Pumps, &c.

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New York Wholesale Prices, May 21, 1879.

## HARDWARE.

[illegible]

Fast Joint Narrow		.....	dis 25
Lx. Narrow		.....	dis 25
Loose Joint Broad		.....	dis 60
Loose Butts, Back Flaps, &c.		.....	dis 25
Inside Flats, Regular		.....	dis 25
Light		.....	dis 25
Loose Fin. Wrt.		.....	dis 25
Spring Hinges		.....	dis 25
American Spring Spring Butt Co., Tap'd		.....	dis 25
Barnes' Single and Double Acting		.....	dis 25
Babu Mfg. Co.'s Double Acting		.....	dis 25
Central, Japan		.....	dis 25
Ornamental		.....	dis 25
Spring Hinge Co.'s		.....	dis 25
No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		.....	dis 25
Union Mfg. Co.		.....	dis 25
Bommer's		.....	dis 25
Blind Screws		.....	dis 25
Palmer		.....	dis 25
Seymour		.....	dis 25
Lull & Porter		.....	dis 25
Nicholson		.....	dis 25
No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		.....	dis 25
Clark's, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100		.....	dis 25
Buffalo "Noiseless"		.....	dis 25
Barnes		.....	dis 25
Butchers' Cleavers		.....	dis 25
Humason & Beckley Mfg. Co.		.....	dis 25
Bradley's		.....	dis 25
Beasley		.....	dis 25
1		.....	dis 25
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64		.....	dis 25
65		.....	dis 25

Breast, Miller's Pails.....	each \$2.50	dis 20 %
Miller's Pails.....	each \$2.50	dis 20 %
Ratchet.....	" " "	do 35 %
" " Whinery's.....	" " "	do 35 %
" " Ingalls' (old list).....	" " "	do 35 %
" " Moore's Triple Action.....	" " "	do 20 %
Whitney's Hand Drill.....	" " "	do 20 %
Wing's Hand Slicer.....	" " "	do 20 %
Automatic Boring Tools.....	each \$2.75	dis 20 %
Drill Chucks—Moran's Beach Patent.....	do 35 %	
Dunbury.....	\$3.00	dis 35 %
<b>Ice Heaters.</b>		
Family.....	✓ dos \$2.00	dis 35 %
National.....	✓ dos \$4.95	dis 35 %
<b>Screw Buckets.</b>		
Mil E. Buckets, light, 3½ to 16 in., (Duc's Improved).....	✓ nos \$5.00 to \$4.00	net
Mil E. Buckets, heavy, 12 to 16 inch.....	✓ nos \$8.00 to \$2.00	net
Storehouse, (Duc's) Patent 12 to 17, \$12.00 to \$20.00.....	✓ nos \$12.00 to \$20.00	net
<b>Emery and Emery Paper.</b>		
Gentle Chester—rectangular.....	✓ nos 10	
" " Flour and Fd.....	✓ nos 10	
Washington Mill.....	✓ nos 10	
" " Flour.....	✓ nos 10	
Wellington Mills, Grain.....	✓ nos 10	
Hampden Emery Grain.....	✓ nos 10	
I. & A. Emery Patent.....	✓ nos 10	
<b>Canned and Tinned Ware.</b>		
Kettles.....	dis 45 %	
Tin Cans.....	dis 35 %	
Tinned Sauce Pans.....	dis 35 %	
<b>Escutcheon Pins.</b>		
Iron.....	dis 35 %	
Brass.....	dis 35 %	
<b>Escutcheons.</b>		
Same discounts as Door Locks.....	dis 35 %	
Wood.....	dis 35 %	
Penn's.....	dis 50 %	
" " Cork Stops.....	dis 45 %	
Frary's Patent Petroleum.....	dis 20 %	
Wood and Metallic.....	dis 45 %	
Locks.....	dis 45 %	
Metallic Key, Leather Lined.....	dis 45 %	
Cork Lined.....	dis 45 %	
Locks.....	dis 45 %	
<b>Felice Plates.</b>		
Files.....	✓ dos 15c,	dis 50 %
American File Co.....	✓ dos 15c,	dis 50 %
Auburn.....	✓ dos 15c,	dis 50 %
Acme.....	✓ dos 15c,	dis 50 %
Chapman.....	✓ dos 15c,	dis 50 %
Nicholson.....	(Nicholson List) dis 35 %	
Hieker & Bros.....	✓ dos 15c,	dis 50 %
J. & J. Riley Carr.....	✓ dos 15c,	dis 50 %
Stubs.....	✓ dos 15c,	dis 50 %
Walton & Sons.....	✓ dos 15c,	dis 50 %
Walker Spencer & Co.'s "Diamond".....	✓ dos 15c,	dis 50 %
Fisher.....	✓ dos 15c,	dis 50 %
H. D. Watson & Sons (new list).....	✓ dos 15c,	dis 50 %
Western (new list).....	✓ dos 15c,	dis 50 %
Latham & French.....	✓ dos 15c,	dis 50 %
<b>Fluting Machines.</b>		
Knox, 4-inch Rolls.....	✓ dos 15c,	dis 50 %
" " ".....	✓ dos 15c,	dis 50 %
Peerless, 4-inch Rolls.....	✓ dos 15c,	dis 50 %
Eagle, 3½-inch Roll.....	✓ dos 15c,	dis 50 %
Eureka, No. 1, 4-inch Roll.....	✓ dos 15c,	dis 50 %
No. 2, 4-inch Roll.....	✓ dos 15c,	dis 50 %
Domestic Fluter, No. 1, 4-inch Roll.....	✓ dos 15c,	dis 50 %
Crown Jewell.....	✓ dos 15c,	dis 50 %
Domestic Fluter, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000		

Gate, Clark's No.	.....	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000	
" Automatic	.....	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000	
" Common Sense	.....	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000	
" Shepherd's	.....	No. 24	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000
Rolled Blind Hinges	.....	dis	60	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200	3250	3300	3350	3400	3450	3500	3550	3600	3650	3700	3750	3800	3850	3900	3950	4000	4050	4100	4150	4200	4250	4300	4350	4400	4450	4500	4550	4600	4650	4700	4750	4800	4850	4900	4950	5000	5050	5100	5150	5200	5250	5300	5350	5400	5450	5500	5550	5600	5650	5700	5750	5800	5850	5900	5950	6000	6050	6100	6150	6200	6250	6300	6350	6400	6450	6500	6550	6600	6650	6700	6750	6800	6850	6900	6950	7000	7050	7100	7150	7200	7250	7300	7350	7400	7450	7500	7550	7600	7650	7700	7750	7800	7850	7900	7950	8000	8050	8100	8150	8200	8250	8300	8350	8400	8450	8500	8550	8600	8650	8700	8750	8800	8850	8900	8950	9000	9050	9100	9150	9200	9250	9300	9350	9400	9450	9500	9550	9600	9650	9700	9750	9800	9850	9900	9950	10000
" Rolled Raised	.....	dis	60	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200	3250	3300	3350	3400	3450	3500	3550	3600	3650	3700	3750	3800	3850	3900	3950	4000	4050	4100	4150	4200	4250	4300	4350	4400	4450	4500	4550	4600	4650	4700	4750	4800	4850	4900	4950	5000	5050	5100	5150	5200	5250	5300	5350	5400	5450	5500	5550	5600	5650	5700	5750	5800	5850	5900	5950	6000	6050	6100	6150	6200	6250	6300	6350	6400	6450	6500	6550	6600	6650	6700	6750	6800	6850	6900	6950	7000	7050	7100	7150	7200	7250	7300	7350	7400	7450	7500	7550	7600	7650	7700	7750	7800	7850	7900	7950	8000	8050	8100	8150	8200	8250	8300	8350	8400	8450	8500	8550	8600	8650	8700	8750	8800	8850	8900	8950	9000	9050	9100	9150	9200	9250	9300	9350	9400	9450	9500	9550	9600	9650	9700	9750	9800	9850	9900	9950	10000
" Wrought Strap and 1, list Dec. 20, '77	.....	dis	60	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200	3250	3300	3350	3400	3450	3500	3550	3600	3650	3700	3750	3800	3850	3900	3950	4000	4050	4100	4150	4200	4250	4300	4350	4400	4450	4500	4550	4600	4650	4700	4750	4800	4850	4900	4950	5000	5050	5100	5150	5200	5250	5300	5350	5400	5450	5500	5550	5600	5650	5700	5750	5800	5850	5900	5950	6000	6050	6100	6150	6200	6250	6300	6350	6400	6450	6500	6550	6600	6650	6700	6750	6800	6850	6900	6950	7000	7050	7100	7150	7200	7250	7300	7350	7400	7450	7500	7550	7600	7650	7700	7750	7800	7850	7900	7950	8000	8050	8100	8150	8200	8250	8300	8350	8400	8450	8500	8550	8600	8650	8700	8750	8800	8850	8900	8950	9000	9050	9100	9150	9200	9250	9300	9350	9400	9450	9500	9550	9600	9650	9700	9750	9800	9850	9900	9950	10000
" Providence ".....	over 10 in. 40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600	610	620	630	640	650	660	670	680	690	700																																																																																																																																							

[illegible]



**Sandrieo.**

**Aph. atom.**..... \$ 91.  
**Ammonia.**.....  
**Chalk.**.....  
**Block.**.....  
**Dryer, Patent, Am.**.....  
**Prostings.**.....  
**Glass, White.**.....  
**Shed.**.....  
**Glaziers' Points, Zinc.**.....  
**Gum, Copal.**.....  
**Damasc.**.....  
**Shellac, English.**.....  
**dark.**.....  
**Litharge, English.**.....  
**Mineral Wool.**.....  
**Pumice Stone, selected Lump.**.....  
**powdered.**.....  
**Pufty, in bladders.**.....  
**in bulk.**.....  
**Rotten Stone, soft, English.**.....  
**Spirits Turpentine.**.....  
**Whiting Spanish.**.....

**Glass.**

**FRENCH WINDOW GLASS.**

*Prices current per box of 30 feet.*

**Single Thick.—Discount 60¢ per \$**

SIZES.	1st.	2d.	3d.	4th
0 X 8 to 10 X 15.....	\$ 8.00	\$ 6.75	\$ 4.81	\$ 5.7
11 X 14 to 16 X 20.....	16.75	8.00	7.00	7.5
18 X 22 to 20 X 30.....	16.75	10.00	7.5	8.7
18 X 36 to 24 X 36.....	13.75	11.50	10.00	
20 X 36 to 24 X 36.....	15.50	13.75	11.25	
20 X 36 to 28 X 48.....	14.75	13.75	11.25	
20 X 48 to 32 X 50.....	16.25	15.00	13.00	
20 X 48 to 32 X 50.....	17.25	16.00	13.00	
20 X 48 to 34 X 50.....	16.75	15.75	13.00	
24 X 58 to 34 X 60.....	19.43	18.00	16.00	
34 X 58 to 42 X 60.....	21.00	19.50	18.00	

**Double Thick.—Discount 70¢ per \$**

SIZES.	1st.	2d.	3d.	4th.
6 X 8 to 10 X 15.....	\$12.00	\$11.00	\$10.00	\$ 9.5
11 X 14 to 16 X 20.....	14.75	13.75	12.75	11.75
18 X 22 to 20 X 30.....	19.00	17.75	15.50	
18 X 36 to 24 X 36.....	21.50	19.43	18.50	
20 X 36 to 24 X 36.....	23.00	20.75	18.25	
20 X 36 to 28 X 48.....	24.00	23.00	19.25	
20 X 48 to 32 X 50.....	27.00	25.00	21.25	
20 X 48 to 32 X 50.....	28.50	26.00	22.25	
20 X 48 to 34 X 50.....	30.00	27.75	24.75	
24 X 58 to 34 X 60.....	34.75	30.00	26.75	
34 X 58 to 42 X 60.....	35.50	30.50	26.25	

Sizes above 40 X to \$10.00 per box extra for every five inches.

An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 40 inches in length, and not making more than 80 united inches, will be charged in the 80 united inches brackets.

**LB. BRIDGE,**

**St., New York.**

**in, 14 in. Plates. Shears for Plates and Bars**

**Hand and Power**

**PUNCHING PRESSES.**

**Steel, adapted to all trades.**

**"CHAMPION"**

**Freezers.**

**SIZES.**

3 Quart Geared.	16 Quart Fly Wheel
4 " "	20 " "
6 " "	32 " "
8 " "	40 " "
10 " "	32 " Frame.
12 " "	40 " "
20 " "	

Two 20 Quart Duplex.

**Not the Cheapest, but the Best.**

Send for illustrated Price List.

Address Sole Manufacturers,

**Sidney Shepard & Co.**

**BUFFALO, N. Y.,**

**OR**

**CHICAGO, ILL.**

**Y PAN,**

**n one Piece.**

**COMPANY,**

Patented Nov. 14, 1895;  
Feb. 4, 1896.

**BROWN'S**

**HOG AND PIG**

**RINGER AND RINGS**

Only single ring in the market that closes on the outside of the nose. No sharp points in the nose to keep it sore.

**BILL**

**USKER**

maker in the  
pers say it  
be no other.

**ENLAN, Exclusive Manufacturers, Decatur, Ill.**



# AMERICAN SCREW CO.,

Providence, R. I.,

**MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,**

**AND INCREASING THE ASSORTMENT DAILY.**

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a **lower cost to the consumer** than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

## INTERNATIONAL EXHIBITION.

No. 235.)

**PHILADELPHIA, 1876.**

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

### REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: **Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.**

G. L. REED, Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,  
Jas. Bair,  
Chas. Staples,

G. L. Reed,  
J. D. Imboden,

J. Diffenbach,  
Dav. McHardy

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Award,  
Given by authority of the United States Centennial Commission.

[L.S.] J. L. CAMPBELL, Secretary.

A. T. GOSHORN, Director-General.  
J. R. H. President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

Experience has shown that the wear point of screws, as formerly made, is at the heel of the thread, where all

1776.



1846.



Section at Line A B

Section at Line C D

Section at Line E F

1876.



Section at Line A B

Section at Line C D

Section at Line E F

Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

### CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."



# B. KREISCHER & SONS, FIRE BRICK AND CLAY RETORT WORKS.

Established 1845.  
Office, foot of Houston Street, East River,  
NEW YORK.

The largest stock of Fire Brick of all shapes and  
sizes on hand and made to order at short notice.  
Cupola Brick, for McKensie Patent,  
and others. Fire Mortar, Ground Brick, Clay and  
Sand. Superior Kaolin for Rolling Mills and found-  
ries. Stone Ware and other Fire Clay and Sand,  
from my own mines at New Jersey and Staten  
Island, by the cargo or otherwise.

## NEWTON & CO.,

Successor to  
PALMER, NEWTON & CO.,  
ALBANY, N. Y., Manufacturers of

# FIRE BRICK

Stove Linings,  
Range and Heater Linings  
Cylinder Brick, &c., &c.

## M. D. Valentine & Bro

Manufacturers of

# FIRE BRICK

And Furnace Blocks  
DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

## A. HALL & SONS, Perth Amboy, N. J.

ESTABLISHED 1846.

## HALL & SONS, Buffalo, N. Y.

ESTABLISHED 1866.

# FIRE BRICK

of reliable quality for all purposes, manufactured of  
the best New Jersey Fire Clay. Also, Architectural  
Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire  
Brick and Diamantine Building Brick.

## Brooklyn Clay Retort

AND

# FIRE BRICK WORKS.

Manufacturers of Clay Retorts, Fire Bricks, Ga-  
House and other Tile, Cupola Brick, &c. Dealers in  
and Miners of Fire Clay and Fire Sand. Clay bank at  
Bar's Creek, New Jersey. Manufacture: Van Dyke,  
Elizabeth, Richards and Partition Sts., Brooklyn, N. Y.  
Office No. 88 Van Dyke St.

## Watson Fire Brick Manufactory

ESTABLISHED 1836.

JOHN R. WATSON, Perth Amboy, New Jersey.

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For Rolling Mills, Blast Furnaces, Foundries,  
Gas Works, Lime Kilns, Tanneries, Boiler  
and Grate Setting, Glass Works, &c.

FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

## HENRY MAURER,

Proprietor of the

# Excelsior Fire Brick & Clay

Retort Works,

Manufacturer of FIRE BRICK, HOLLOW  
BRICK AND CLAY RETORTS.

WORKS PERTH AMBOY, NEW JERSEY

Office & Depot: 418 to 422 East 23d St., N. Y.

## TROY FIRE BRICK WORKS

Troy, N. Y.,

JAMES OSTRANDER & SON,

ESTABLISHED 1848,

Manufacturers of

# FIRE BRICK,

Tuyeres, Tiles, Blast Furnace Blocks, etc. Miners and  
Dealers in Woodbridge Fire Clay and Sand, and Staten  
Island Kaolin.

Established 1864.

## GARDNER BROTHERS,

MANUFACTURERS OF

# STANDARD SAVAGE

Fire Brick, Tile & Furnace Blocks,

OF ALL SHAPES AND SIZES.

Clay Gas Retorts and Retort Settings,

AND

Miners and Shippers of Fire Clay.

Office: 376 Penn Ave., Pittsburgh, Pa.

WORKS: Mt. Savage Junction, Md., and Lockport, Pa.

## BORGNER & O'BRIEN,

Manufacturers of

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Clay Gas Retorts,

Retort Settings,

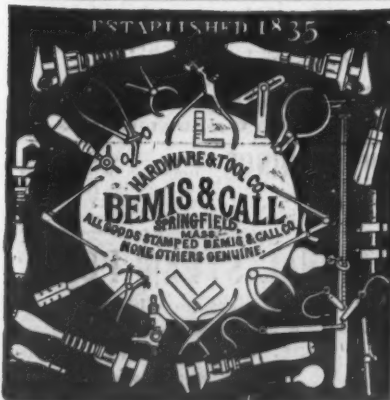
Tiles, Blocks, &c., &c.

23d St., below Vine,

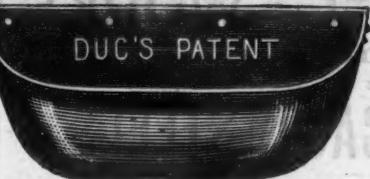
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Eighteen years' practical experience.

CYRUS BORGNER. WM. J. O'BRIEN



# DUC'S IMPROVED ELEVATOR BUCKET.



THE STORE-HOUSE BUCKET.  
(Partial straight front.)  
In 12 in., 14 in., 16 in. and 17 in. Sizes.

Made of Best Charcoal Stamping Iron.  
No Corners to Catch.  
Light Running and Very Durable.  
The only Scientifically Constructed Elevator Bucket  
in the Market.



THE  
MILL BUCKET.  
In 3 1/2 in. to 10 in.  
Sizes.

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# NICHOLSON FILE CO., FILES AND RASPS.

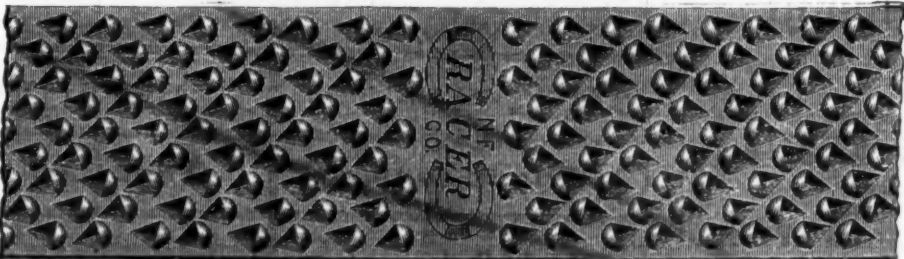
Manufacturers of

## Filers' Tools & Specialties.

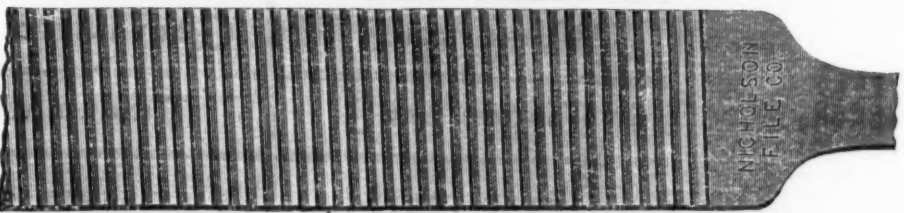
Manufactory and Offices at Providence, R. I.

The following space will be used in illustrating our specialties, the matter being changed weekly.

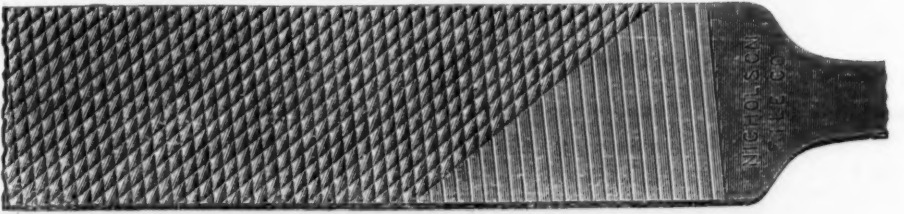
### IMPROVED HORSE RASPS.



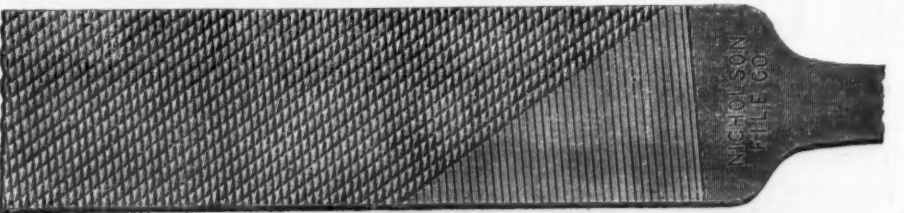
### LEAD FLOAT.



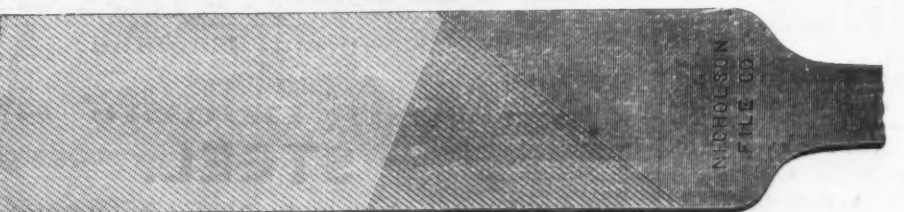
### BRASS COARSE.



### BRASS BASTARD.



### FINISHING 2d CUT.



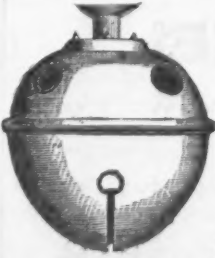
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Butchers' Cleavers,  
Butchers' Choppers,  
Axes and Hatchets,  
Grub Hoes and Mattocks,  
Mill Picks,  
Box Chisels and Scrapers,

Ring Bush Hooks,  
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Established 1839.  
Bevin Bros. Mfg.  
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House, Tea, Hand,

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Bell Metal Kettles.

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Pure White Lead, Red Lead, Litharge,  
Orange Mineral, Linseed Oil,  
AND PAINTERS' COLORS

Brooklyn White Lead Co.



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White Lead, Red Lead & Litharge.

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## JOHN JEWETT & SONS,

Manufacturers of the well-known brand of

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The Atlantic White Lead

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ENGLISH WHITE LEAD, RED LEAD and LITH-

ARGE. Genuine. Best Quality. Low Prices.

Do not hesitate to write for information.



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Manufacturers of

Clock Springs and Small Springs

of every description, from best Cast Steel, 11

BRISTOL, CONN.

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Hardware & Metal Broker,

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MANUFACTURERS' AGENT,

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Representing in the Dominion of Canada several

American Manufacturers, is ready to accept

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Sole Agents for **COCKER BROTHERS, Limited**  
Successors to **SAMUEL COCKER & SON, (ESTABLISHED 1753.)**  
**SHEFFIELD, ENGLAND.**

Sole manufacturers of  
'SC' **EXTRA' Cast Steel,**  
AND  
**CAST STEEL WIRE** for all purposes.

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Cocker's "Meteor" Wire Plates.  
Railroad Supplies and General Merchants.  
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**STEEL AND FILES,**  
Hammers, Anvils, Vises, Blacksmiths' Tools.  
**WARRANTED CAST STEEL.** Specially adapted for Dies, Punches,  
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ALSO, THE WORLD-RENOVED  
**IMPROVED MILD CENTERED CAST STEEL.**  
Specially adapted for Taps, Reamers, Milling Tools, &c. Warranted  
not to crack in hardening Tools of any size.  
SHEET, GERMAN, MACHINERY, SPRING AND EVERY OTHER DESCRIPTION OF STEEL.  
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Manufacturers of  
**CRESCENT STEEL,**  
In Bars, Sheets, Cold-Rolled Strips, &c.  
Polished, Compressed Drill Rods and Wire,  
Warranted equal to any imported in quality, finish and accuracy.  
Also Common Grades.

Established 1810.  
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Manufacturers of the "Celebrated"  
**"DOG BRAND" FILES.**  
Also of Superior  
**STEEL**  
For Drills, Cold Chisels, Tools, Taps, Dies, &c.  
**COLD ROLLED STEEL** for Clock Springs, Corsets, &c.  
**SHEET CAST STEEL** for Springs, Saws, Welding and Stamping Cold, &c.  
GERMAN, MACHINERY, ENGLISH AND SWEDISH SPRING STEEL,  
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**WIRE OF ALL KINDS,**  
Steel Horse Shoes, Tire, Axles and other Forgings,  
Boiler Plate, Galvanized and Black Sheet Iron, Corrugated Roofing and  
Siding of Siemens-Martin, Bessemer Steel and Iron.  
All made from our own Lake Superior Ores. **CLEVELAND, OHIO.**  
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Particular attention is paid to quality and temper for FILES, SAWS, EDGE TOOLS,  
TABLE and POCKET CUTLERY, TOOLS, TAPS and DIES; also for COLD ROLLED STEEL for  
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A Large Assorted Stock of JOHN ROTHERY'S FILES always on hand.

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**BENJAMIN ATHA & CO.,**  
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**BEST REFINED CAST STEEL.**

Warranted most superior for TOOLS AND GRANITE ROCK DRILLS  
A full assortment of this universally approved OLD BRAND and other Steels for sale by  
**EDWARD FRITH & SON, Agents,**  
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**SMITH, SUTTON & CO.,**  
MANUFACTURERS OF ALL KINDS OF  
**STEEL.**

Also Springs, Axles, Rake Teeth, &c.  
OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny.  
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Represented at Boston by WETHERELL BROS., 21 Oliver St.; at Milwaukee by JOHN FREITLAF, 43 to 49 West  
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Railroad Iron, Pig Iron, Merchant and Ship Iron,  
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<b>STEEL</b> of all kinds.	<b>BRIGHT WIRE</b>
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<b>WIRE RODS</b>	<b>GALVANIZED WIRE</b>
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Sole Manufact'rs of **"CHOICE" Extra Cast Steel.**  
Manufacturers of all Descriptions of Steel.  
Manufacturers of Every Kind of Steel Wire.  
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Manufacturers of the Celebrated  
**Cast and Double Shear STEEL.**

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Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.  
Warehouse, 95 John Street, New York.  
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**Torrey's Patent**  
COG WHEEL  
**Ice Cream Freezers.**  
**P. R. DUNNE,**  
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**Special Steel**  
FOR  
**LATHES, PLANERS, &c.**

Turns out at least double work by increased speed  
and feed, and cuts harder metals than any other  
steel. Neither hardening nor tempering required.

Sole Makers  
**SAMUEL OSBORN & CO.,**  
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Represented by  
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**STEELINE.**  
Used for refining and tempering all kinds of  
Steel Tools.  
Increases their Durability at least five fold.  
Secures absolute safety from cracking.  
Send for circular to  
**BAUER & CO., 96 Greenwich Av., N. Y.**

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**GUNPOWDER.**

**DUPONT'S**  
Rifle, Sporting and Blasting Powder  
The most popular Powder in use.

Dupont's Gunpowder Mills, established  
in 1801, have maintained their great reputation  
for 70 years. Manufacture the following cele-  
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**DUPONT'S DIAMOND GRAIN,**  
Nos. 1 (coarse) to 4 (fine), unequalled in strength, quick-  
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Pigeon Shooting.

**DUPONT'S EAGLE DUCKING,**  
Nos. 1 (coarse) to 3 (fine), burning slowly, strong and  
clean; great penetration; adapted for Glass Ball,  
Pigeon, Duck and other shooting.

**DUPONT'S EAGLE RIFLE,**  
A quick, strong, clean Powder of very fine grain for  
Pistol shooting.

**DUPONT'S RIFLE, Fg. "Sea Shooting,"**  
Ffg and Ffgg.—The Ffg for long range rifle shoot-  
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strong and moist.


Also all kinds of Sporting, Mining, Shipping and  
Blasting Powders of all sizes and descriptions. Special  
grades for export. Also, Muzzle, Cannon, Mortar  
and Mammoth Powder, U. S. Government standard.  
Powder manufactured to order of any required grain  
or proof. Agencies in all cities and principal towns  
throughout the U. S. Represented by

**F. L. KNEELAND, 70 Wall St., N. Y.**  
N. B.—Use none but Dupont's Fg or Ffg Powder  
for long-range Rifle shooting.

**GUN POWDER.**  
**Laflin & Rand Powder Co.**  
No. 26 Murray Street, New York.  
Manufacture and sell the following celebrated brands  
of Sporting Powder known everywhere as  
**ORANGE LIGHTNING,**  
**ORANGE DUCKING,**  
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more popular than any Powder now in use.  
Blasting Powder and Electrical Blasting  
Apparatus.  
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SAFETY FUSE, FRICTIONAL & PLATINUM  
FUSES.  
Pamphlets showing sizes of grain sent free.

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**Walter R. Wood,**  
**GRINDSTONES.**  
Berea, O., Nova Scotia, & other brands  
283 and 285 Front Street, New York.

**WORTHINGTON & SONS.**  
North Amherst, Ohio.  
Manufacturers of  
Lake Huron Amherst  
and Berea  
**GRINDSTONES.**

**BOYD & CHASE,**  
The largest manufacturers in the world of  
**OIL**  **STONE**  
Of all description.  
107th Street and Harlem River,  
Send for Illustrated Price List. **NEW YORK**

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Manufacturers of **Importers of**  
Berea, O., Newcastle, Eng.,  
Black River, O., Wickesley, Eng.,  
Lake Huron, Mich., Nova Scotia,  
**GRINDSTONES,**  
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**S. H. JENNINGS,** Deep River, Conn.  
Agent in the United States for the HIGHEST  
GRADE OF LONDON GROUND EMERY. Prices  
low. Do not hesitate to write for information.

**NATIONAL STEAM PUMP.**  
Adapted to every possible Duty.  
Send for Illustrated Catalogue.  
**WM. E. KELLY,**  
New Brunswick, N. J.  
New York Salesroom, 25 Murray St.



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## THE EDGAR THOMSON STEEL CO., LIMITED.

MANUFACTURERS OF

### STEEL RAILS, BLOOMS & INGOTS

General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.  
New York Office, 57 Broadway.

The members of the Edgar Thomson Steel Company, Limited, have had large experience in manufacturing and in railway management; their works are the most complete in the world, with all the late improvements, and are located in the best Bessemer metal district in the United States, and their managing officers are experienced in the manufacture of Bessemer Steel.

The Company warrants its rails equal in quality to any manufactured in the United States.

Halls of any weight or section furnished on short notice. Orders for trial lots solicited.

Branch Office and P. O. Address, No. 48 Fifth Ave., Pittsburgh, Pa.  
D. McCANDLESS, Chairman. W. F. SHINN, General Manager.

## JOHN WILSON'S CELEBRATED

### BUTCHERS' KNIVES,

### BUTCHERS' STEELS,

### AND SHOE KNIVES.

THE TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY JOHN WILSON.



GRANTED A.D. 1766, BY THE CORPORATION OF CUTLERS OF SHEFFIELD, AND PROTECTED BY ACT OF PARLIAMENT.

Works: SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1750

BUYERS ARE SPECIALLY CAUTIONED AGAINST IMITATIONS OF THE MARK, AND THE SUBSTITUTION OF COUNTERFEITS BEARING THE NAME, "WILSON," ONLY.

## North Chicago Rolling Mill Co.

ESTABLISHED 1857. CAPITAL, \$3,000,000. INCORPORATED 1869.

Works at Chicago, Ill., and Milwaukee, Wis.

MANUFACTURERS OF

MERCHANT BAR, FISH PLATES, PIG METAL, IRON RAILS & BESSEMER STEEL RAILS.

CAPACITY OF WORKS.		
Fish Plates.....	20,000	TONS
Merchant Bar.....	40,000	"
Pig Metal.....	80,000	"
Iron Rails.....	80,000	"
Steel Rails.....	50,000	"
Total Capacity per year.....	250,000	"

OFFICES:

17 Metropolitan Block, Chicago, Ill.  
37 Mitchell Block, Milwaukee, Wis.

O. W. POTTER, President, CHICAGO.  
S. P. BURT, Vice-President, NEW BEDFORD.  
S. CLEMENT, Treasurer, MILWAUKEE.  
R. C. HANNAH, Secretary, CHICAGO.

## HERMANN BOKER & CO.,

101 and 103 Duane Street, New York.

PROPRIETORS OF



WISE & TOOL WORKS.

PICKS, MATTOCKS, CRUB HOES, HAMMERS.



### WROUGHT IRON STEEL FACE

(P. W. PATTERN.)

"FULLY WARRANTED."



Sole Agents for

H. Boker & Co.'s Celebrated "Tree" Brand Cutlery.  
H. Heinisch's Sons Unrivaled Shears, Trimmers, Scissors, Japanned and Nickled.  
Ward & Payne's Sheep Shears. Peugeot Brothers' Horse Clippers.

J. W. GARDNER'S

Unequaled and "Warranted Superior to All"

Pocket Knives and Barlows.

Also a full stock of

Geo. Westenhelm & Sons', W. & S. Butcher's, Manhattan and O. K.

POCKET CUTLERY & RAZORS.

LAMSON & GOODNOW MFG. CO.

TABLE CUTLERY,

Guns and Pistols

FISHING TACKLE,

Arms and Ammunition.

## Philadelphia Smelting Co.,

S. E. Cor. Twelfth and Noble Sts., PHILADELPHIA.

### Genuine Babbitt,

Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.

### ALL GRADES OF ANTI-FRICTION METALS.

### DEOXIDIZED BRONZE,

Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals, Solders, Stereotype Metal, Gas and Steam Fittings and Fixtures, Brass and Composition Castings.

Send for circulars.

# WIRE NAILS

French Points,

Window Shade Nails,

## Upholstering, WAGON NAILS, Molding Nails,

(Sample Cards sent on application.)

Electrotype,

Roofing Nails,

Barbed Caster Nails.

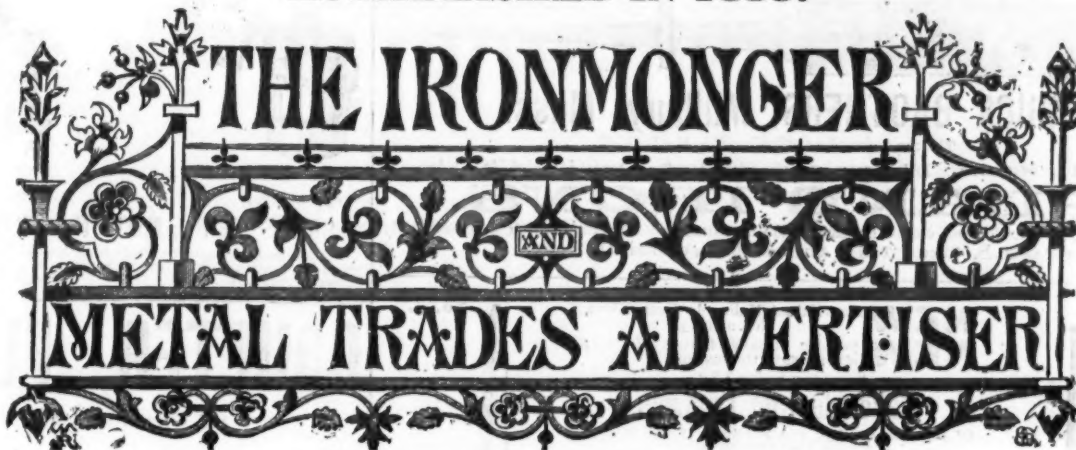
Vener Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Lock Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. packages: 1 lb. papers, or as wanted.

## AMERICAN WIRE NAIL CO.

Factory, Fifteenth and Madison Sts.

COVINGTON, KY.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

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This is an annual, presented free to every Subscriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

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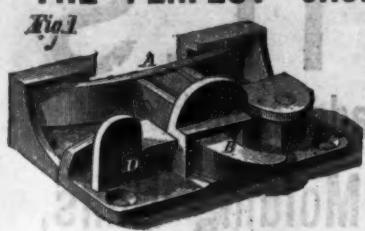
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### THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and *FOREIGN SUPPLEMENT* is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.



## THE PERFECT SASH TIGHTENER AND LOCK.



Manufactured entirely from Malleable Iron, Burglar Proof, Anti-Rattling, Draws Sash to Exact Center. No Springs to Get out of Order.  
The Best in the Market.

## METALLIC CLOTHES PIN.



For either Wire or Rope Line, Will securely hold any article, from a silk handkerchief to a carpet. No article can be blown away. Does not soil the clothing. Manufactured by CLARK & SMITH, Patentees, Chester, Orange Co., N. Y. SOLE AGENTS,

J. I. BROWER & SON,

286 Greenwich St., New York,

Who keep a general assortment on hand for the country trade. Jowett's Horse Ramps, 14, 15 and 16 inch, Maharay's #10 Tire Shrinker, Heller's Rasps. Send for Circular. SPECIAL DISCOUNTS TO JOBBERS.



## BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels,

## PLANE IRONS.

Gauges of all lengths and circles beveled inside or outside. Nail Sets, Scratch and Belt Awns. Chisel Handles of all kinds. Carving Tools. Also small Boxes of tools of best quality.



NEW sizes Patent Malleable Iron Oilers, Nos. 2 and 3. pattern Heavy Screw Clamps; strongest in the market. Send for Price List.

## Malleable Iron Castings

Of superior quality, and Hardware Specialties in Malleable Iron made to order. HAMMER & CO., Branford, Conn.

## THE LEADING WRINGER OF AMERICA.

## SIMPSON &amp; GAULT,

(Peerless Wringer Co.)

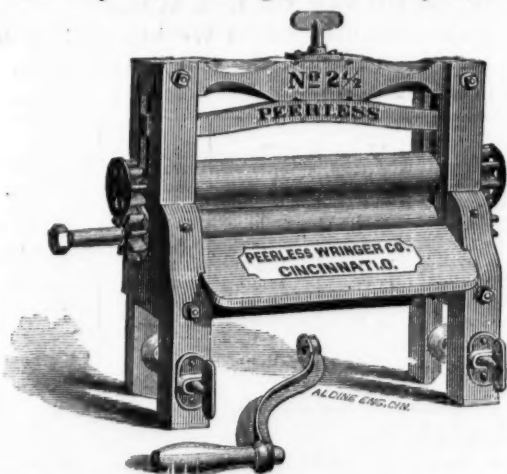
New York Office:  
79 Chambers Street.

Office and Factory:  
Cincinnati, O.

## PEERLESS CLOTHES WRINGERS,

Sold by the Jobbing Trade everywhere.

No Better in the World.



Strongest and Handsomest.

Most Saleable Wringer in the Market. TRY A SAMPLE ORDER.

## STANDARD NUT CO.,

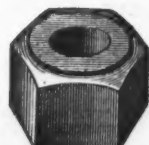
Pittsburgh, Pa.,

MANUFACTURERS OF



## HOT PRESSED

Square & Hexagon Nuts,



R. R. FISH BARS,

BOLTS.

SPIKES,

RIVETS, &c.



## THORNE, DeHAVEN &amp; CO., Drilling Machines,

21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction. RADIAL DRILLS. Self-feed—Large Adjustable Box Table. VERTICAL DRILLS. Self-feeding. MULTIPLE DRILLS. 2 to 20 Spindles. HORIZONTAL BORING AND DRILLING MACHINES. HAND DRILLS. CAR BOX DRILLS. SPECIAL DRILLS. For Special Work.

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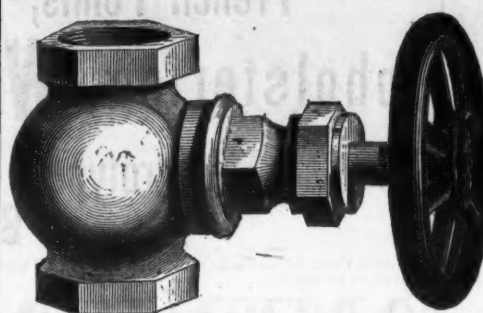
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For STEAM, WATER and GAS.

Iron Pipe and Fittings.

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New Illustrated Catalogue and Price List sent by express to the Trade on application.



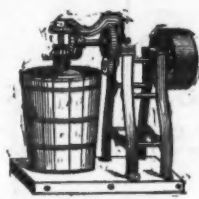
Factory, Paterson, N. J.

56 John Street, N. Y.



HAND FREEZER.

2 to 25 qts. \$3.50 to \$25.00



HAND OR POWER.

25 and 50 qts. \$75.00 and \$175.00



HAND OR POWER ICE CRUSHER.

\$75.00.

## SANDS' TRIPLE MOTION WHITE MOUNTAIN ICE CREAM FREEZERS.

Galvanized iron outside, tin inside. No secretions of acids or zinc need be feared in the use of this Freezer. Simple in construction, perfect in results. Send for descriptive circular and discounts of this celebrated Freezer. Address WHITE MOUNTAIN FREEZER CO., Lacuna, N. H.

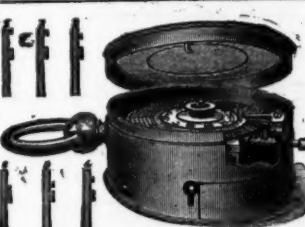
## COULTER, FLAGLER &amp; CO.,

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## Hardware Manufacturers' Warehouse.



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IMPORTANT FOR ALL LARGE CORPORATIONS AND MANUFACTURING CONCERNS.

Capable of controlling with the utmost accuracy the motion of a watchman or patrolman as the same reaches different stations of his beat. The instrument is complete in itself, portable and as reliable as the best lever watch. It requires no fixture or wires communicating from room to room, as is the case with the ordinary watch clocks. A small, inexpensive stationary key is alone required at each station. The instrument will, in all cases, be warranted perfect and satisfactory. R. B.—The suit against Imhaeuser & Co., of New York, was decided in my favor, June 10, 1874. Another suit has been decided against them and a fine assessed Nov. 11, 1876, for selling contrary to the order of the Court. Persons using clocks infringing on my Patent will be dealt with according to law.

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In sending for circular or ordering the above, please mention this paper.

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WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marches.

The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each, of 50 lbs. weight, suitable for shipping by land or water to any part of the world.

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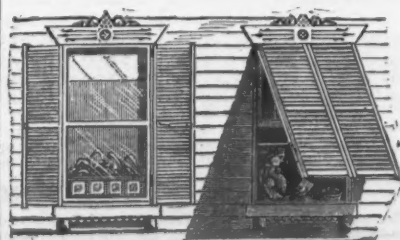
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SEMPLE & BIRGE MFG. CO., Agents at St. Louis.

## Dearborn's Pat. Adjustable Blind Awning Fixtures.



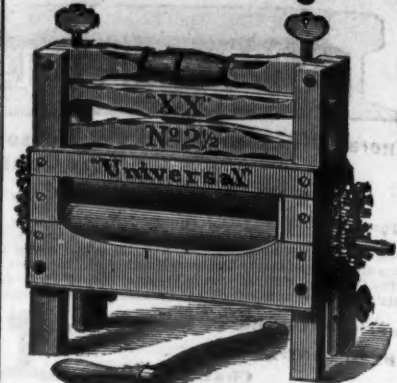
Either old or new Blinds thus fitted can be opened in the usual way or used as an awning at pleasure.

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The most perfect Dinner Pail in the world. Hot coffee for dinner and a Lantern at night.

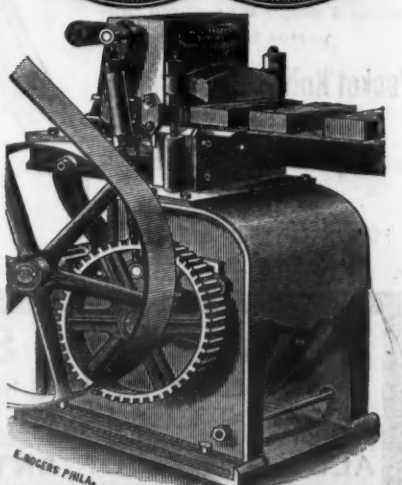
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AMONG THE "Masterpieces Centennial Exposition, 1876."

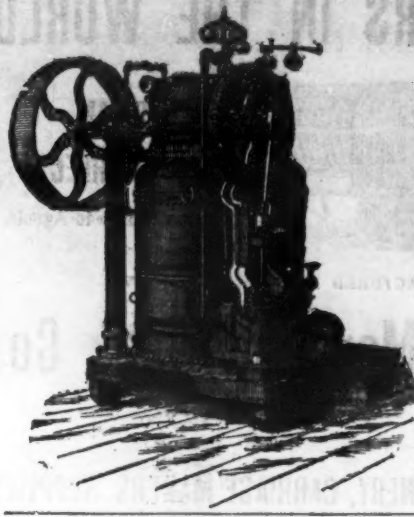


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Patented Feb. 10, 1874.  
Retissued June 22, 1875.  
Compact, Practical, Durable and Economical.

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## Patent Anti-Friction Hoisting Block.

For hoisting Coal, Ore, Ice, or other heavy work, where Steam or Horse power is used. Made of Galvanized Iron and Steel, and not affected by exposure to weather.

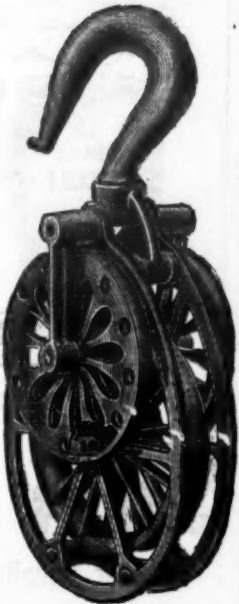
Twenty-four feet hoist turns the friction wheels on the side around once.

The Block uses 3 inch to 4 inch rope, and will sustain with safety a load of 4 tons.

Will run either end up, or on its side. The lightest running and most durable Block yet produced.

Satisfaction guaranteed. Try one.

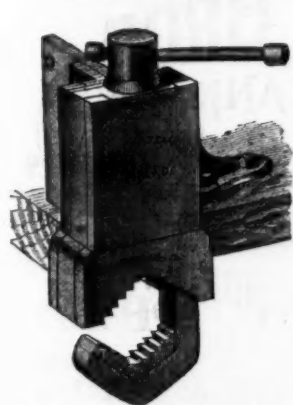
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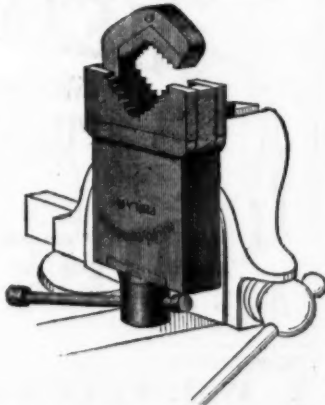
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STRONG,  
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CHEAP.



To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work bench, attached to angle plate or can (unlike others) be held between the jaws of any Machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in from end, and allows of FITTINGS BEING HELD SECURELY; the Box is made of Malleable Iron, the Screw of Wrought Iron, and the remainder of Solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is strong, light, efficient and cheap which can be readily carried about with kit of tools.

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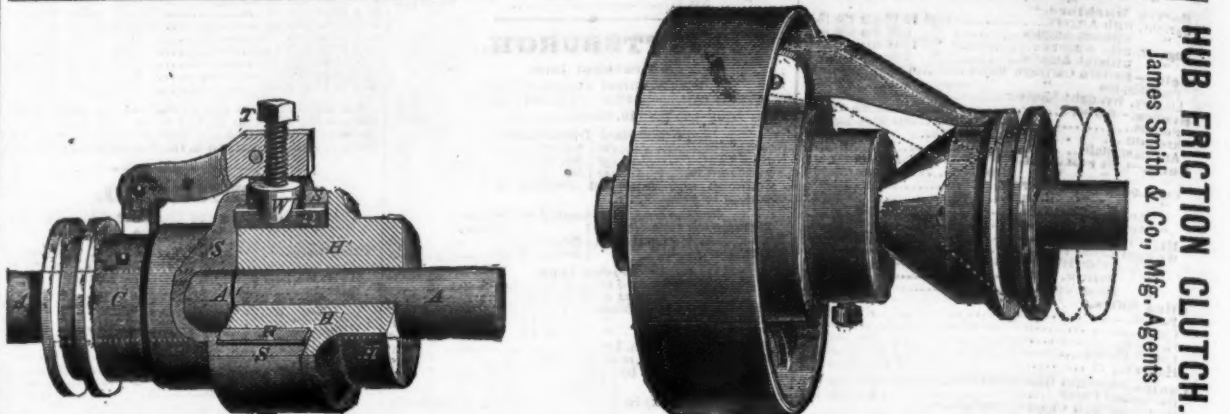
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Expanding, Self-Draining  
RUBBER BUCKET.  
Manufactured only by  
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## PATENT HUB FRICTION CLUTCH.

Manufactured by the **HUB FRICTION CLUTCH CO., Limited, Philadelphia.**

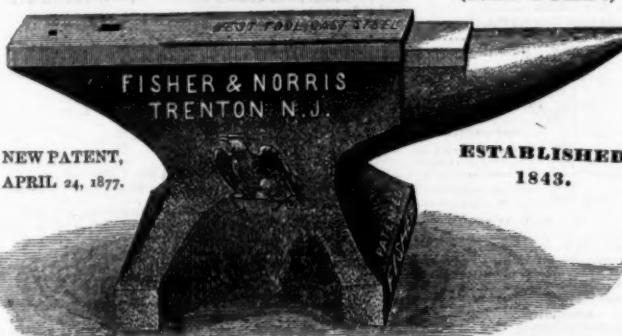
We claim for this device the following advantages for a perfect clutch, it having been adopted by several of the leading manufacturers of machinery and machinists' tools: It works easily but effectively. It works instantly and without noise. It is very durable, and is extremely simple and cheap, and has proven itself to be the best clutch in the market. Special arrangements can be made with leading manufacturers for the adoption of this clutch for their own tools. This clutch can and will be sold for less money than any other clutch in the market.

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**JAMES SMITH & CO., Mfg. Agents, 137 Market Street, Philadelphia.**

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NEW PATENT,  
APRIL 24, 1877.

ESTABLISHED  
1843.

## WARRANTED!!

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Face in one piece, of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true; of hardest temper and never to come off or "settle." Horn of tough untempered steel, never to break or bend. It does not bounce the hammer back, and therefore can do more work with lighter hammer. Only Anvil made in United States fully warranted as above. None genuine without our trade mark.

New Price List, April 1, 1879.

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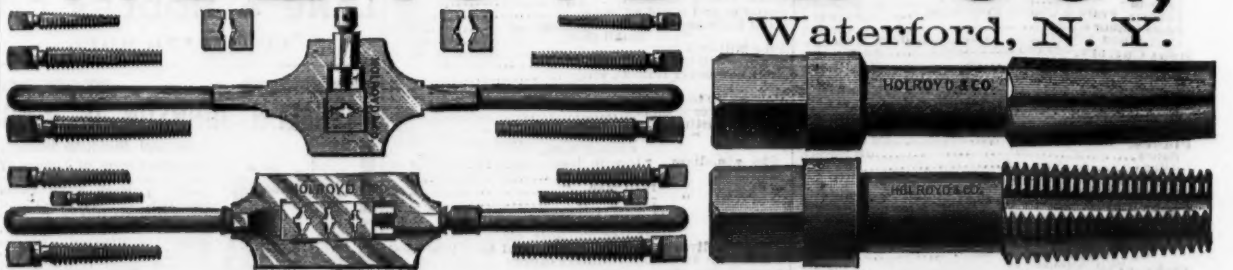
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Also VALVES, PIPING and VISES.

The Largest Stock in the City.

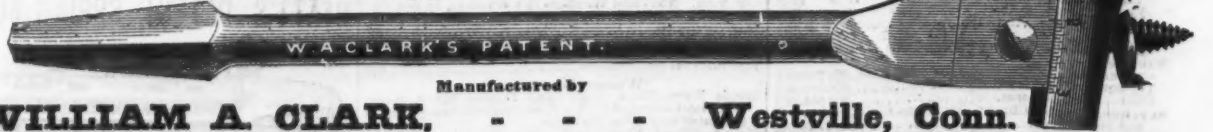
## HOLROYD & CO.,

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## CLARK'S PATENT EXPANSIVE BITS

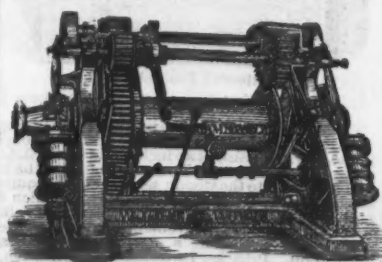
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Two sizes: Large Size Boring,  $\frac{3}{4}$  to 3 inches; Small Size Boring,  $\frac{1}{4}$  to  $1\frac{1}{4}$  inches.



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The "Ramsay Improved Steam Winder,"  
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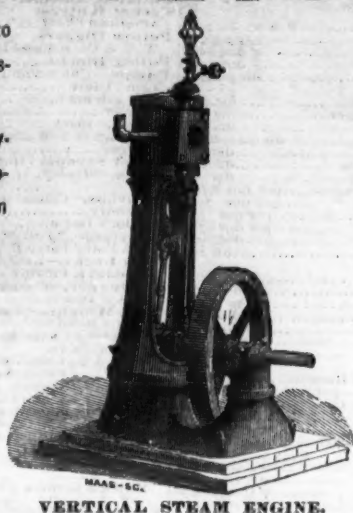






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All kinds of Hoisting Machinery a specialty.

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Automatic machines to straighten and cut wire of all sizes to any length; to cut and mill wire for butt pins, bolt shanks and similar articles; to make all kinds of staples, with either square, fleam, chisel or shear points; to roll points on picture nails and similar articles without heat; to cut and form wire into various shapes and sizes, such as rings, buckles, fence bars and similar articles; to make spiral springs; and for other special purposes to order.

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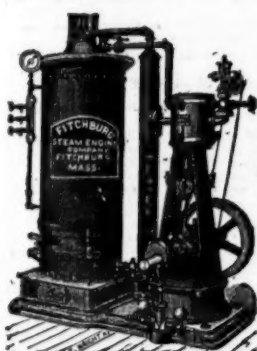
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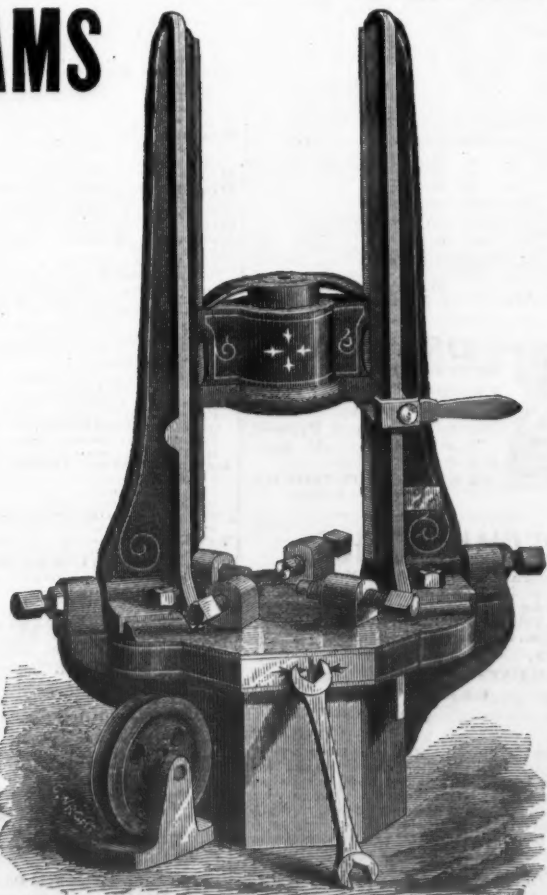
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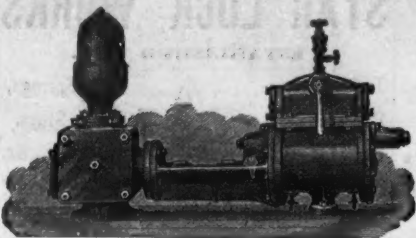
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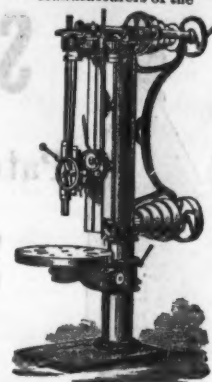
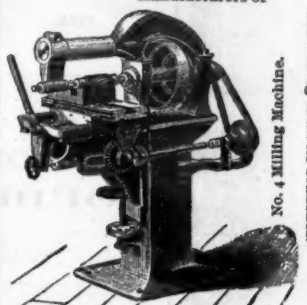
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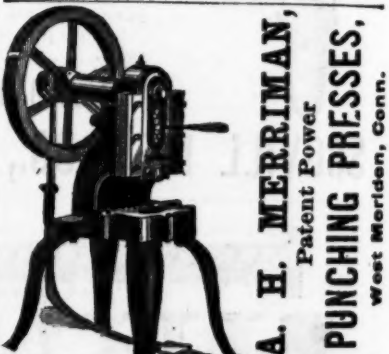
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THE HANCOCK INSPIRATOR,**  
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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

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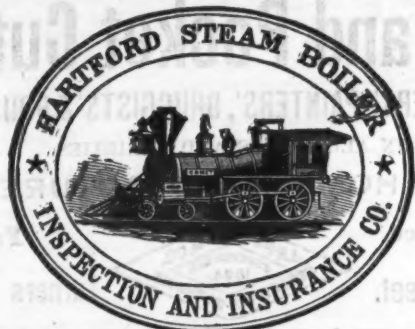


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No Charge for Boxing or Cartage.

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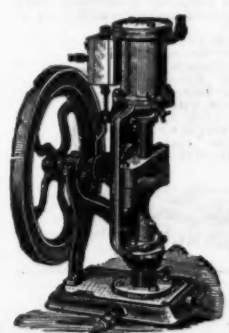
Full information concerning the plan of the Company's operations can be obtained at the COMPANY'S OFFICE, HARTFORD, CONN., or at any Agency.

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A New, Cheap and Simple Boiler Feeder.

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Patent Friction Hoisting Engines

For Mines, Quarries, Dock Building &amp;c.

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Correspondence solicited.

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Manufacturer of the largest variety of Chucks in the world.  
Agents wanted.TURNED  
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Heads and points to sample.

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BAEDER, ADAMSON & CO.,  
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(Also in Rolls, for machine work.)

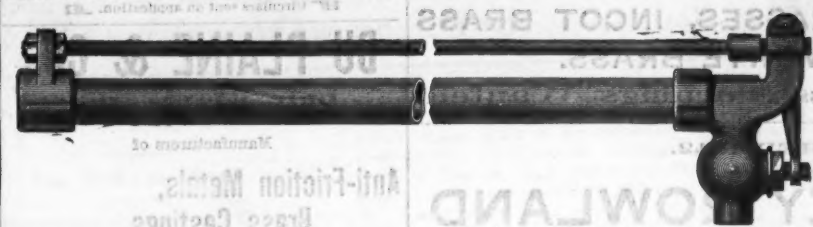
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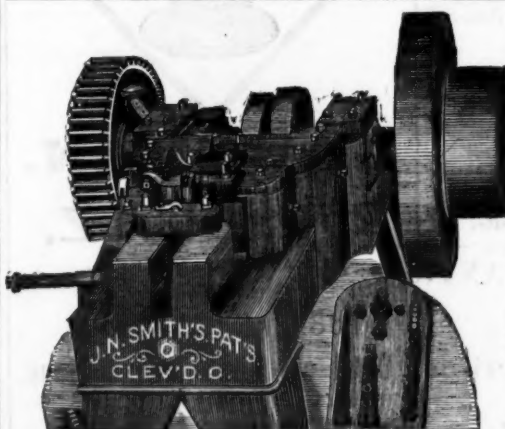
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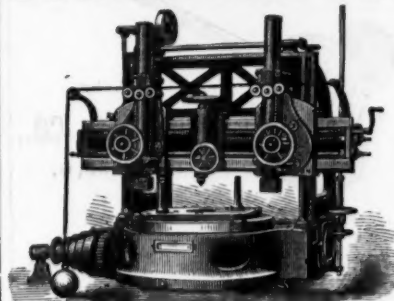
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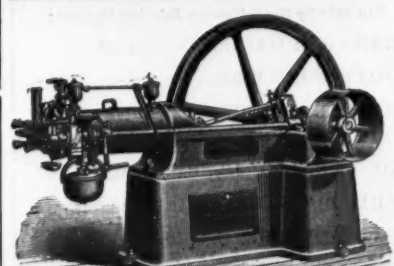
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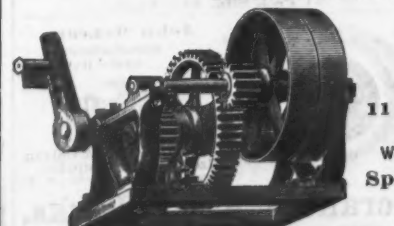
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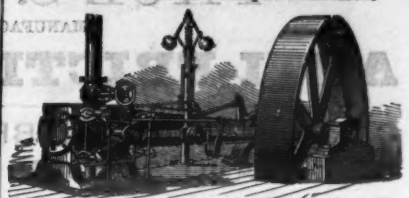
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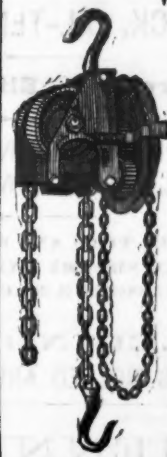
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8 "	2,000 "	30 00	1 50
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9 "	4,000 "	60 00	2 00
10 "	6,000 "	75 00	2 30
10 "	8,000 "	95 00	2 40
12 "	12,000 "	150 00	3 75
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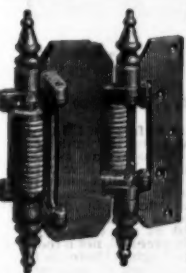
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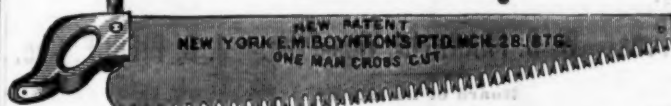
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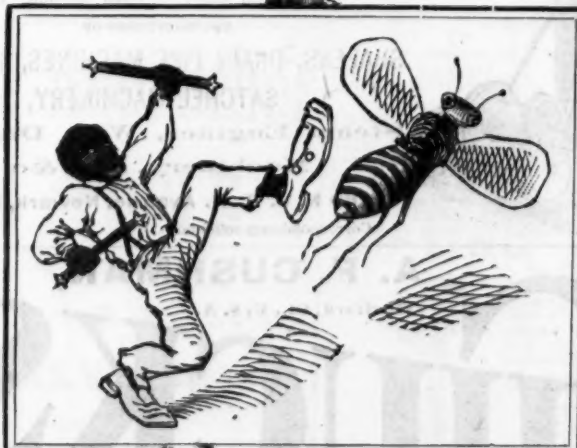
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The Emperor Dom Pedro, accompanied by Director General Goshorn, Superintendent Albert, and others, visited Machinery Hall at the Centennial on the evening of June 28th. Among other things inspected, at the invitation of E. M. Boynton, of New York, they witnessed a trial of the New Lightning Saw, patented March 26, 1875. Two men, with one of these saws, cut off a sound log of gum-wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corlies, Morell, Lynch, and other members of the commission, witnessed the trial and timed the cutting. The Emperor remarked, "That was fast, very fast cutting." Last evening the Emperor made another examination of the saw. Philadelphia Press, June 30.

"Boynton's Saws were effectively tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log, 11 inches in diameter, was sawed off, with a 4 1/2 foot lightning cross cut, by two men, in precisely 6 seconds, as timed by the chairman of the Centennial Judges of Class Fifteen. The speed is unprecedented, and would cut a cord of wood in 4 minutes. The representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries, were present, and expressed their high appreciation." Received Medal and Highest Award of Centennial World's Fair, 1876. \$1000 challenge was prominently displayed for six months, and the numerous saw manufacturers of the world dared not accept it, or test in a competition so hopeless.

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